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# REPTILES OF ALL LANDS

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IN THE four orders of scaled and shielded forms that make up the class of reptiles, we have a vivid illustration of a rapidly degenerating race of creatures. The reptiles of former periods—of hundreds of thousands of years ago—were by far the most gigantic inhabitants of this globe.

In comparison with the ages of other groups of the earth's varied vertebrate life, the reptiles have passed through some abruptly terminated epochs. Paleontology teaches us that the age of gigantic reptiles came to a sudden close. Important climatic changes or disturbances were probably responsible for this, for warmth is one of the absolute necessities of a reptile's life. The earth is undoubtedly a far cooler sphere than during the age of the great reptiles.

In consequence we find the legions of modern reptiles, the members greatly reduced in size, occurring compactly around the world within the equatorial parallels. As we look to the north or the south, away from the region of greatest heat, the number of species and the size of their representatives will be seen to rapidly decline. The reptiles of the temperate zones are of comparatively insignificant size and pass the cold season in an absolutely dormant and helpless condition.

While the trend of evolution has been to greatly reduce the size of the surviving reptiles, the variability and number of forms have as substantially increased. In the ages that are gone a bird's-eye view of the earth's surface would have revealed varied, monstrous forms lumbering here and there, reveling in an atmosphere reeking with humidity; some browsing in giraffe-like fashion among high branches, others churning through the sea in pursuit of their prey; even in the murky atmosphere itself cold-blooded creatures like gigantic bats flapped their way in pursuit of equally gigantic insects.

While but a very few examples of the modern reptiles anywhere approach the size of their rock-bound and now fossil ancestors, they occur to the number of over 4,000 species. It should have been explained that a fifth order of reptiles has its place in classification. It is made up of a single genus and species, the tuatera, a lizard-like creature of New Zealand. It is the oldest surviving type of reptile and apparently related to the long-extinct *Plesiosaurus*.

## CROCODILES AND ALLIGATORS

Of direct, ancient lineage, the modern crocodiles and alligators furnish us with a hint of the gigantic forms of reptile life

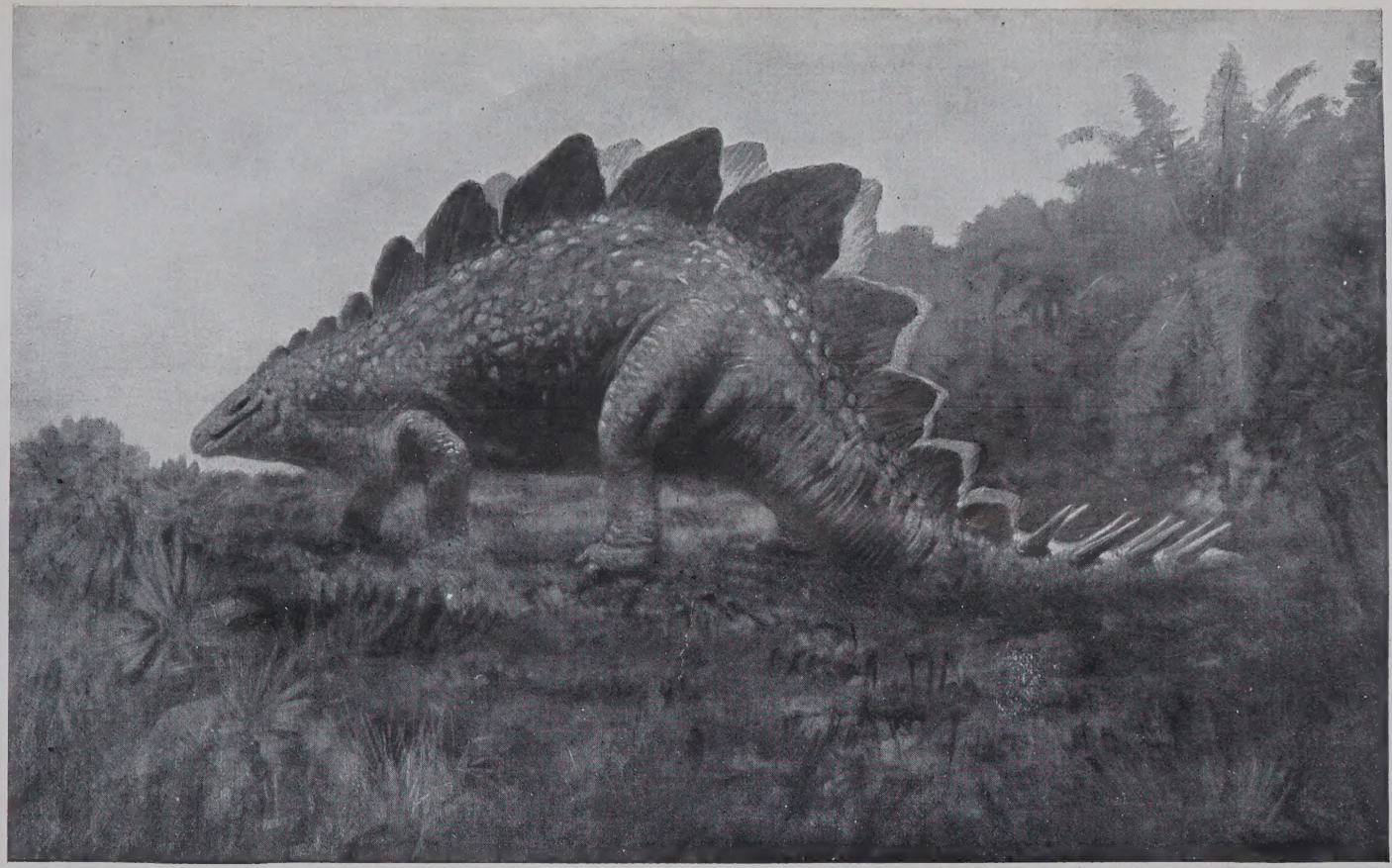
BRONTOSAURUS

The Brontosaurs ranged from 40 to 60 feet long. Their thigh bones measured 5 to 6 feet in height, being the largest single bone known to us, while some of the vertebræ were 4½ feet high, exceeding in dimensions those of the whale. From F. A. Lucas, Director American Museum of Natural History, in "Animals of the Past." Courtesy of the American Museum of Natural History and Dr. Henry Fairfield Osborn.

ILLUSTRATION OF THE DIPLODOCUS

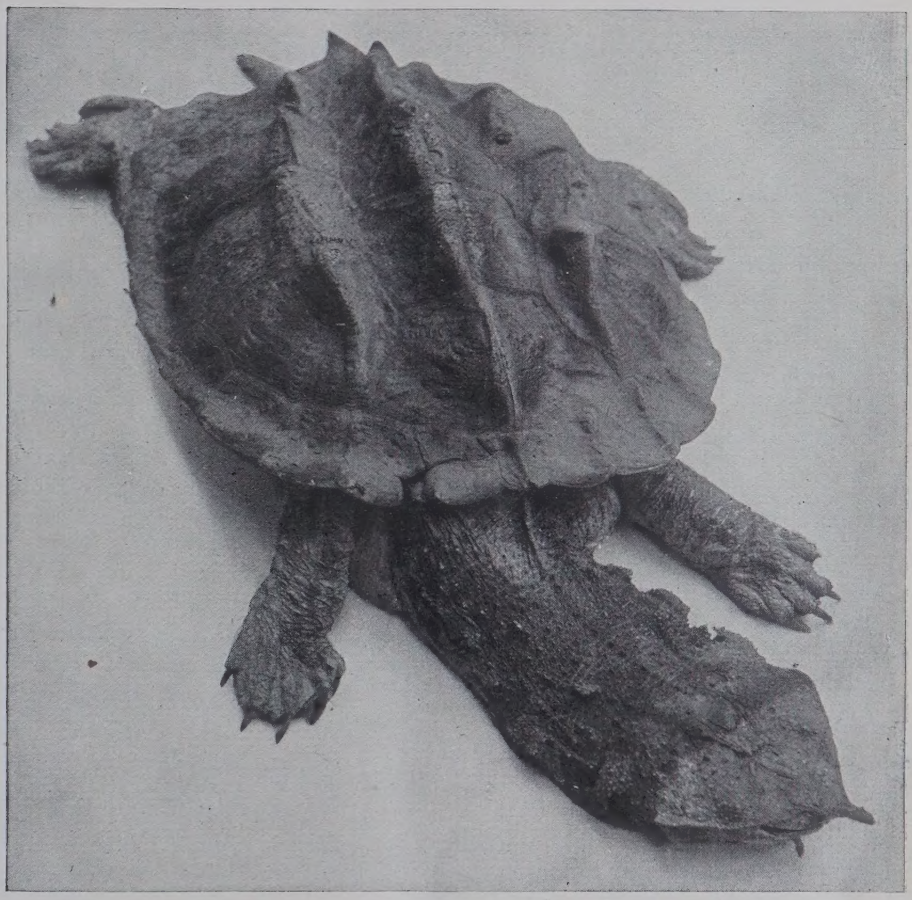
The head was so small and so poorly provided with teeth that it must have been quite a task or a long-continued pleasure, according to the state of its digestive apparatus, for the animal to have eaten its daily meal. It is pretty safe to say that the Diplodocus weighed 20 tons and would devour over 700 pounds of leaves or twigs or plants each day. One can readily see the advantage of the long neck in browsing off the vegetation on the bottom of shallow lakes while the animal was submerged, or in rearing the head aloft to scan the surrounding shores for the approach of an enemy; or, with the tail as a counterpoise, the entire body could be reared out of water and the head be raised some 30 feet in the air. From F. A. Lucas, Director American Museum of Natural History, in "Animals of the Past." Photo from the late Charles R. Knight.

once existing. Ages ago the crocodilians were generally distributed throughout the world; the zone of decadence is now marked by fossils in the temperate regions, giving way to the living representatives which have survived within the tropics. While a few species stray out of this area, their distribution fol-



STEGOSAURUS

The Stegosaurs, or Plated Lizards, were among the most singular of all known animals. They had diminutive heads, small fore legs, long tails armed on either side near the tip with two pairs of large spines, while from these spines to the neck ran series of large, but thin and sharp-edged plates, standing on edge, so that their backs looked like the bottom of a boat provided with a number of little centerboards. Photo from F. A. Lucas, Director American Museum of Natural History, and Charles R. Knight.



ONE OF NATURE'S NONDESCRIPTS: MATAMATA (*Chelys fimbriata*), GUIANAS

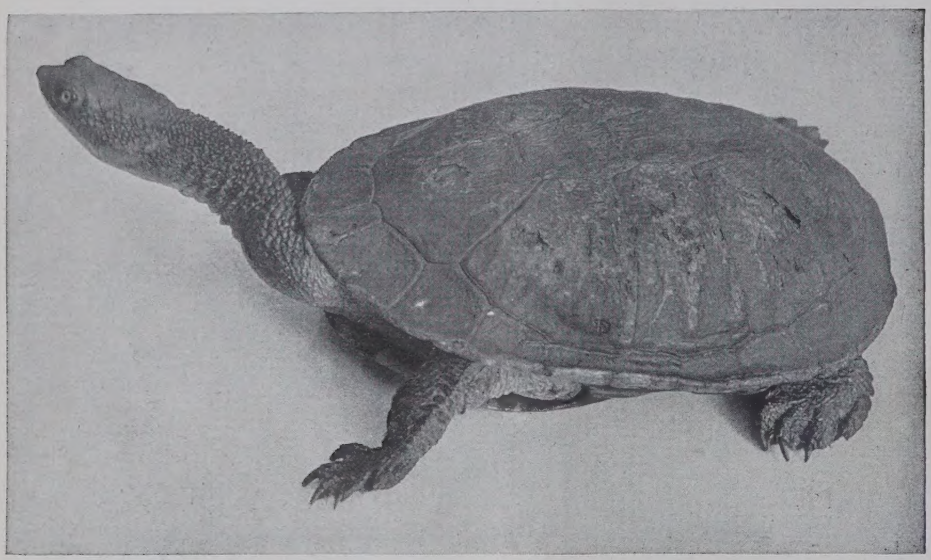
The flattened head terminates in a tubular appendage, the neck has a waving fringe, while the eyes are incongruously small. Its temper is in keeping with its looks (see page 608). Photo by Raymond L. Ditmars.

lows low coastal regions warmed by currents from the tropics.

The largest modern reptile occurs in India, along the Ganges and the Brahmaputra. This is the gavial, a remarkable reptile attaining a length of 30 feet. Despite its great size and bulk and its tooth-studded jaws, it is a timid animal, dashing into the silty, opaque water at the sight of man. Judging from the massive structure of a big specimen, one might be led to believe it would literally wallow for the water when frightened. It is quite nimble, however, and the ponderous creature actually runs for the sheltering current. The prey consists of fish.

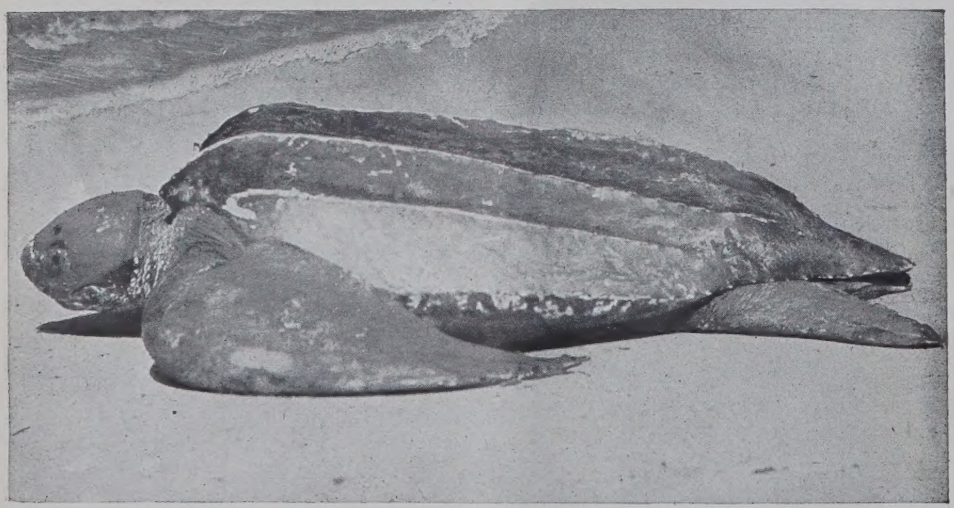
Mr. Lorenze Hagenbeck informs the writer that he shot a 30-foot gavial with a body fully three feet in diameter. The striking feature about the gavial is the structure of the head. From in front of the eyes the snout extends forward in such slender fashion it might be compared to an enormously elongated, duck-like bill. A photograph of this important reptile is presented on page 614.

The salt-marsh crocodile of Malaysia



SNAKE-NECKED TURTLE (*Chelodina longicollis*) : AUSTRALIA

The serpentine neck is too long to be tucked back into the shell. When the animal is frightened a portion of the neck is folded sideways along the inner margin of the shell (see page 609). Photo by Raymond L. Ditmars.



LEATHERY TURTLE (*Sphargis coriacea*) : TROPICAL SEAS

This sea giant is by far the largest of the turtles. There are records of 1,000-pound specimens. It appears to be the survivor of an ancient group of reptiles. Photo by Raymond L. Ditmars.

GIANT TORTOISE (*Testudo elephantina*) : ALDABRA ISLANDS

A number of species of gigantic tortoises inhabit miniature archipelagoes in the Indian and Pacific oceans. These island monsters appear to be survivors of ancient races of reptiles. Photo by Raymond L. Ditmars.

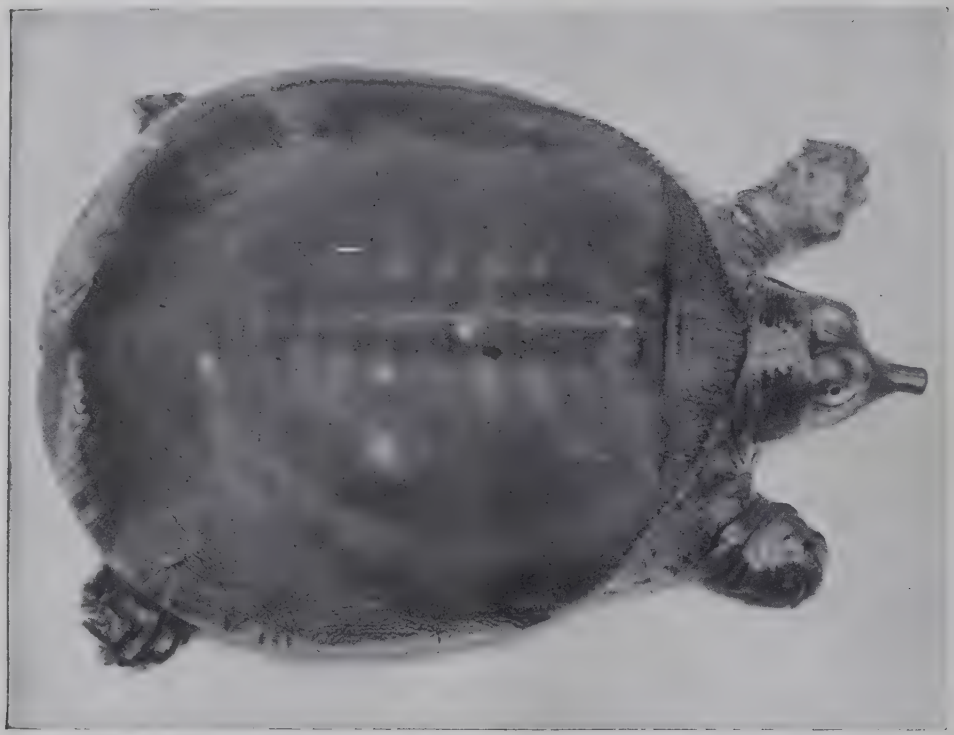
is another monster reptile, attaining a length of 20 feet. Together with the Nile crocodile, it has a bad reputation regarding the destruction of human life. The American species appear to be inoffensive, though some grow to huge proportions. In captivity, however, they become bold by constantly observing the presence of their keepers, and are liable to attack a man without warning.

Attaining the greatest bulk of any of the modern reptiles, the crocodilians have been alleged to grow very slowly and reach remarkable ages. Judging from observations that have been made in the reptile-house of the New York Zoological Park, the growth of alligators and crocodiles is quite rapid. Some alligators hatched in the building increased from a length of seven inches to the substantial size of over eight feet within a period of eight years.

### THE TORTOISES AND TURTLES

Made up of 11 families, 52 genera, and over 225 species, the turtles and tortoises form another order of the reptiles of quite direct, ancient lineage. There is no great degree of specialization to be noted among these creatures with the exception of the marine species, which, having taken to the sea, have undergone a modification of the limbs, these having developed into flippers.

Strangest among the tortoises and turtles, and appealing to some students as the strangest of all the reptiles, are the gigantic tortoises inhabiting small



SOFT-SHELLED TURTLE (*Trionyx ferox*): SOUTHERN UNITED STATES

Despite its soft shell, the species is by no means defenseless. Provided with keen and powerful mandibles, it deals a bite with the rapidity of a serpent's stroke. A big specimen weighs 40 pounds. The species is edible (see page 609). Photo by Raymond L. Ditmars.

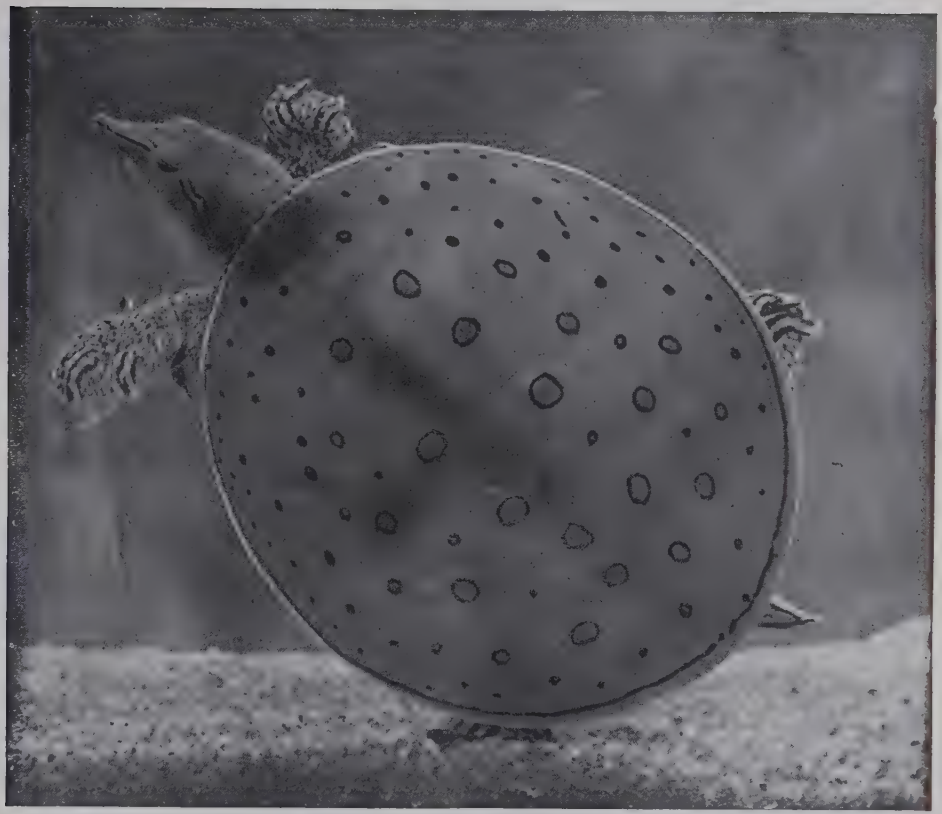
isolated groups of islands in the tropical Pacific and the Indian Ocean. Though the crocodilians and the great sea turtles outclass the present creatures in weight, the latter are, in comparison to other tortoises, of astonishing proportions.

As fossils of closely related species are found on the various continents far north and south of the *habitat* of the survivors, it is reasonable to assume that the races of great tortoises of these miniature tropical archipelagoes have passed through ages when volcanic disturbances shattered great portions of the globe and numerous scaled and plated monsters degenerated and perished.

In an accompanying photograph the reader may compare one of these island patriarchs with a modern tortoise of average size. Six species of the giant tortoises inhabit the Galapagos Islands, which are about 500 miles west of the South American coast and about under the Equator; they occur nowhere else in the New World (see page 607).

The Aldabra Islands, in the Indian Ocean, form the *habitat* of four other species, and four species are also found in the Mauritius-Rodriguez group. A number of expeditions have been dispatched to the colonies of these interesting animals and they are rapidly nearing extinction in a wild state.

Among the freaks of the members of the turtle and tortoise order are the matamata and the snake-necked turtle. The former is found in Brazil and the Guianas. It has a broad, low shell and



SOFT-SHELLED TURTLE (*Trionyx spinifer*): MISSISSIPPI VALLEY

With the young specimens the leathery shell is brightly marked. All of the species of *Trionyx* are edible; this also relating to the cartilaginous "shell." Photo by Raymond L. Ditmars.

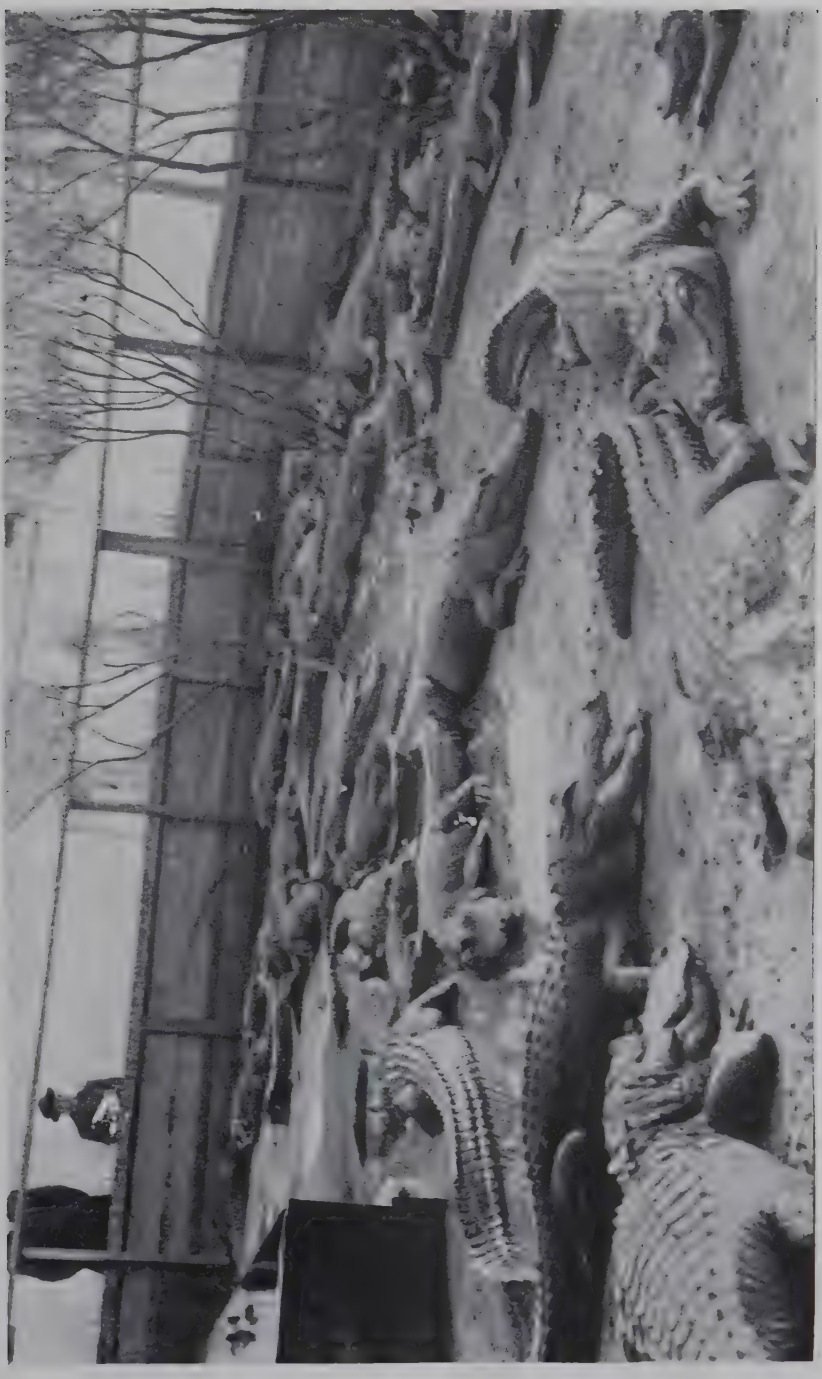
a head and neck so wide and flat that these members look as if pressed out between rollers. In line with this grotesque structure there is a coarse, ragged fringe on the neck, the snout is provided with a tubular appendage, and the eyes are as small as pinheads. This creature attains a weight of 40 pounds. The habits are in keeping with its ugly looks.

Australia and New Guinea form the home of the eccentric snake-necked turtle. The serpentine neck is so long that the creature must double it back in lateral curves in order to draw the head within protection of the shell. This operation throws the head to one side. The characteristic has been responsible for another popular name—the "side-necked" turtle (see page 606).

Not far behind the two mentioned species in eccentricity of development are the soft-shelled turtles. About 15 species are known, forming the family *Trionychidæ*. The New World species are confined to North America. They are strictly aquatic and prefer muddy rivers. The shell is soft and leathery with flabby border, but these turtles are by no means defenseless, as the jaws are powerful and provided with knife-like

Photo by Gilbert H. Grosvenor

A PILE OF YOUNG ALLIGATORS, TWO TO FOUR YEARS OLD, AT THE ALLIGATOR FARM, ST. AUGUSTINE



SOME OF THE BIG FELLOWS AT THE ALLIGATOR FARM, ST. AUGUSTINE, FLORIDA Photo by Gilbert H. Grosvenor

Photo by Gilbert H. Grosvenor

THE KING OF THE ALLIGATOR FARM: ITS AGE IS A DEBATABLE QUESTION

cutting edges. They bite with the rapidity of a serpent's stroke, and a three-foot specimen can amputate a man's finger.

Soft-shelled turtles are good eating and to cook them is not difficult. As the shell itself is edible, the entire animal goes into the frying-pan with no other preparation than cleaning. The negroes appropriately call the small examples "flap-jack" turtles. Very young specimens are beautifully marked and in the water look like variegated leaves (see pages 608 and 609).

### THE LIZARDS

The lizards form the largest order of reptiles. They are particularly interesting as representing the ancestral forms of the serpents. All stages of limb development are to be noted, from the powerful runners and jumpers to species wholly destitute of limbs, that glide like serpents, and other diminutive legless forms that are blind and burrow deep into the soil like earthworms. The immediate relationship between lizards and snakes is strongly evident by the possession among a number of the less specialized serpents of well-developed (internal) hind limbs, which are actually functional. Among the lizards, habits run riot, and among the members of this order Nature has seen fit to lavish the most brilliant colors.

A grand chart showing the geographical distribution of lizards would demonstrate that these reptiles require a greater degree of heat than the turtles or the snakes. They abound in the equatorial latitudes and are but sparingly distributed in the temperate zones. The comparatively very small number of species that occur north or south of the tropics are of small size and quite uniform development. As with the serpents, several families are cosmopolitan. The extensive distribution of the members of genera, however, is particularly marked among the lizards.

Largest among the lizards are the members of a small family—the monitors, genus *Varanus*. There are 27 species, occurring in Africa, India, Malaysia, and Australia. Some of them reach a length of 8 feet and a weight of 60 pounds. All are fleet and powerful, fierce and carnivorous (see page 619).

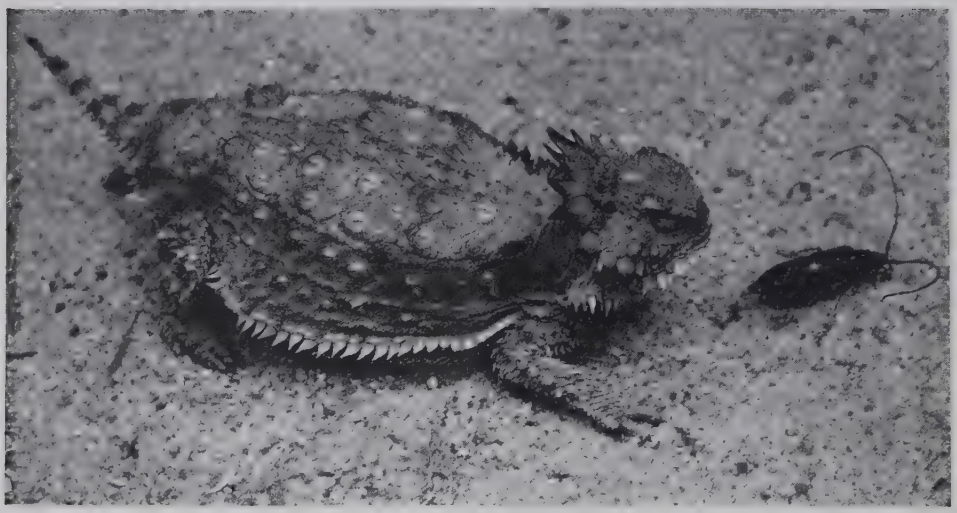
Largest of the living lizards is the Malayan kabara-goya of the Singhalese. This powerful brute attains a length of 8 feet. It frequents the jungles, and many tiger hunters have been startled by the rush of a big monitor, the reptile making as much noise as some big hoofed animal as it tears its way through the undergrowth away from danger. The feeding habits are typical of all the members of the genus.

The method of attacking a small animal more closely resembles the actions of members of the cat tribe than of a reptile. Rushing at its ill-fated prey, the monitor shakes it in the same violent fashion as a terrier treats a rat. If the animal's struggles become so violent that there is a possibility of it escaping, the lizard holds it to the ground under its long claws—as long as those of a leopard. Then the jaws take a better hold.

When the prey is killed it is tossed about in the jaws until the head points down the lizard's throat. It is then gulped down entire, when the monitor wipes the jaws with the enormously long, forked tongue. A kabara-goya can swallow a whole pigeon.

The species is fond of eggs, and one of the sights of a reptile-house is the feeding of the larger monitors. From 8 to 10 hen's eggs are taken at a meal. The eggs are swallowed without breaking the shell and with such rapidity they click against each other in passing down the throat. Digestion is rapid. Within 24 hours the gastric juices have disintegrated the shells and the fragments of these are entirely dissolved.

A monitor of smaller size inhabits the borders of the Sahara Desert. It is of pallid hue, to match the sterile soil; this coloration also relating to the eyes, which, with their staring black pupil, gives the animal a fierce appearance. As if determined to possess some added feature in its makeup, the desert species startles the intruder by widely opening its jaws



HORNED LIZARD (*Phrynosoma regale*): ARIZONA (SEE PAGE 616)

The horned "toads," more properly called the horned lizards, inhabit the desert regions of the United States and Mexico. Sixteen species are recognized. Photo by Raymond L. Ditmars.

SPINY LIZARD (*Zonurus giganteus*): SOUTH AFRICA

Found in dry, rocky places. A big specimen is 15 inches long. Photo by Raymond L. Ditmars

when disturbed, thence disclosing the fact that the mouth parts are as black as if steeped in ink.

Other big lizards are the iguanas, belonging to a New World family that contains both large and small members. Differing from the monitors, the iguanas are omnivorous, and so decorated with spines and protuberances that some of them appeal to the novice like the subjects of a disordered dream. The South American iguana attains a length of six feet and is a wild-looking creature, owing to a high crest of lance-like dorsal spines. It is largely herbivorous, but does not hesitate to rob the nests of small birds or dig into a rotting log for insect prey.

This lizard is edible and subjected to a cruel process in the South American markets, where its flesh is described as much like that of a young fowl. The tip of the longest toe on each hind foot is caught with a pair of pliers and the tendon stretched from the toe itself. By means of the stretched tendons the hind feet are tied together, rendering the lizard helpless.

As an illustration of the tenacity with which reptiles cling to life, it may be mentioned that iguanas are shipped to animal dealers in the United States bound in the manner described, and, though without food or water for weeks, they run about soon after being liberated, and will live for years—this despite the fact that they come from the tropics infested with ticks and other parasites.

A GAVIAL (*Gavialis gangeticus*) COMPARED TO A 6-FOOT MAN; INHABITS THE GANGES

Attains the greatest bulk of any of the modern reptiles. It has been recorded 30 feet long (see page 605)

BLACK TEGU (*Tupinambis nigropunctatus*): GUIANAS AND BRAZIL

The length of a big specimen is three feet. Tegus are carnivorous and often destructive to poultry. Photo by Raymond L. Ditmars

A batch of iguanas from Dutch Guiana were the means of nearly depopulating the reptile-house in the New York Zoological Park. An almost microscopic parasite spread from these lizards among other exhibits of their kind, thence among the serpents. A great number of valuable specimens died from the severe inflammation following the bites of the tiny pests that swarmed in masses that looked like a sprinkling of coarse, red dust. The original hosts suffered little inconvenience. The parasites themselves defied disinfecting and general painting of cages.

The epidemic came to as abrupt a termination as its startling beginning. From the writer's observations he is led to believe that a fungus attacked the invaders, and we have Nature to thank for the close of a situation that threatened to render the reptile-house untenable.

### THE HORNED TOADS THAT SPIT BLOOD

Various members of the *Iguanidæ* are characterized by their droll form or decoration of colors. The horned "toads" belong to this family. These squatty lizards are anything but toad-like in habit, as they inhabit the hot wastes of the desert and run with the speed of the wind (see page 614).

Occasional specimens evince a startling habit of squirting a stream of blood from the eyelid. A Mexican specimen about four inches long gave a fine demonstration of this puzzling habit while being photographed and measured in the writer's laboratory. A pair of shining calipers seemed to greatly excite the lizard. It puffed up its body, the eyes bulged, when a jet of blood as fine as a hair shot a distance of fully five feet, spattering the wall with a shower of tiny drops.

FLYING DRAGON (*Draco volans*): MALAYSIA

By means of elongated, movable ribs the several species of this genus are able to spread a membraneous skin and glide from tree to tree. They do not actually fly. The "wings" of some of the species are brightly colored. Photo by Raymond L. Ditmars.

It has recently been alleged that a small parasite is responsible for this habit. It is thought that a mite causes blisters about the eye, which burst and produce a hemorrhage as the lizard puffs up in angry fashion when handled.

For variability of form the lizards of both the Old and New World stand about equal. A unique development exists among the members of an Old World family, which, possessing enormously elongated ribs covered with dilatable skin, are able to spread these membranes and sail in parachute-like fashion from tree to tree.

The geckos, which are cosmopolitan, have an adhesive pad on each toe, and are able to run inverted on horizontal surfaces with the agility of a fly.

Some of the African desert lizards are

GILA MONSTER (*Heloderma suspectum*): SOUTHWESTERN UNITED STATES

This and another species of the same genus are the only known poisonous lizards. The fangs are grooved and in the lower jaw, and the venom is secreted in the salivary glands. The bite is not so dangerous as that from a venomous snake. Photo by Raymond L. Ditmars

provided with such tiny and almost useless limbs that when frightened they fold these members against the side of the body and literally swim out of sight in the yielding sands.

Unlike the members of the other orders of reptiles, few lizards have become even semi-aquatic. None is strictly aquatic—a condition rendering the order of lizards unique among reptiles.

In the southwestern part of the United States and similar desert regions of Mexico are found the only known *poisonous* lizards, two in number, forming a family by themselves. The more northerly species is popularly known as the Gila monster. It is stout of body, with a short, thick tail. The venom-conducting teeth are in the lower jaw, and the poisonous secretion is much like that of the venomous serpents. Its chemical properties, however, are not so powerful as the virus of snakes, although this lizard must be rated as highly dangerous to man. Captive examples become so tame they may be handled without exhibiting any symptoms of biting. The specimens in the Zoological Park subsist entirely upon raw eggs.

### SNAKES

Snakes are the most widely distributed of the reptiles. They range far beyond the lizards into the temperate regions. In North America serpents extend well into Canada. In the boreal regions of the Old World they extend northward to the latitude

MONITOR (*Varanus gouldi*) : AUSTRALIA

Among the monitors are the largest known lizards. An Indian species grows to be eight feet long. The monitors are strictly carnivorous, fierce and active (see page 613). Photo by Raymond L. Ditmars.

of Iceland. Serpents range in size from the burrowing species of five inches and a body not thicker than a goose-quill to the great pythons, which attain a length of 30 feet and a weight of 300 pounds.

A great proportion of the snakes have become highly specialized. It is among these so-called lowly creatures that we find the most extraordinary and deadly weapons for the purpose of killing the prey that are possessed by any of the vertebrates.

Popular interest is always strong regarding serpents of great size. All of the very large serpents are members of a single family, the *Boidæ*. None is poisonous, and the members of this family kill their prey by constriction—squeezing it to death. In the New World the great constrictors are called boas; they are generally known as pythons in the Old World. There is little structural difference between a boa and a python. One of the characteristics about the members of the *Boidæ* is the protrusion of a pair of internal hind limbs in the shape of stout spurs at the vent. This condition shows the immediate relationship between the serpents and the lizards.

The largest known serpent occurs in the Malay Peninsula, Java, Borneo, and Sumatra. This is the regal or reticulated python. It attains a length of 30 feet. Second in size is the Indian python, inhabiting the Indian Peninsula, Indo-China, the Malay Peninsula, and Java. This constrictor grows to be 25 feet long and is very abundant. The South American anaconda is a close third, and the African python ranks fourth in size. The latter snake appears to attain a maximum length of 18 feet. The dimensions given of these giant serpents are considerably in excess of the average (see pages 630 and 632).

Few regal pythons over 22 feet long are nowadays brought out of Malaysia.

RUBBER BOA (*Charina bottæ*): CALIFORNIA

A diminutive, burrowing representative of the family of great constrictors. It ranges farther from the equator than any other species of the *Boidæ*. Photo by Raymond L. Ditmars.

A snake of this size will weigh, if in well-nourished condition, about 225 pounds. In the wilds these big serpents feed largely upon wild swine. In captivity they prefer pigs to any other diet. They normally feed at about 10-day intervals.

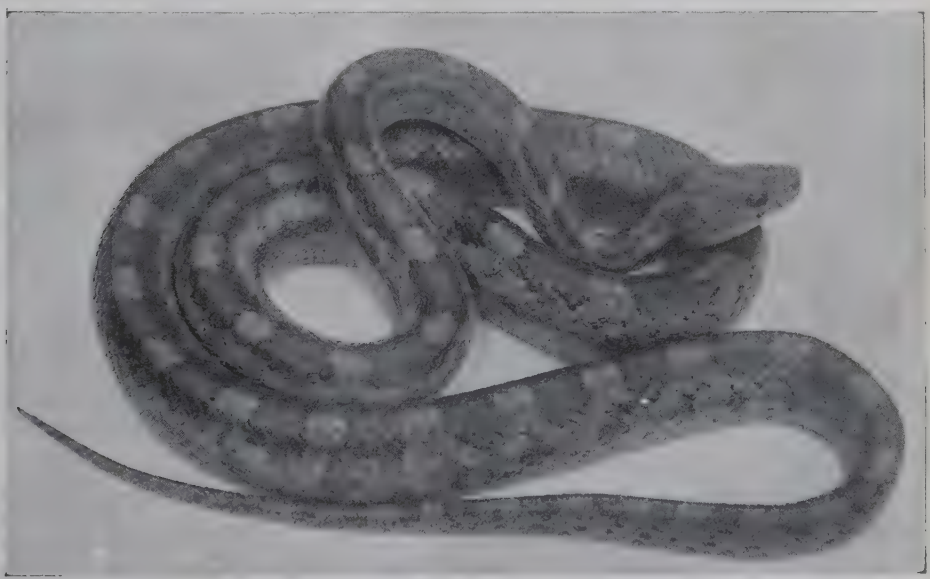
Species of the genus *Boa* inhabiting tropical America attain a maximum length of 12 to 14 feet. They are richly colored and, together with smaller examples of the Indian constrictor, *Python molurus*, are in much demand among the circuses for "snake-charming" exhibitions. The method of procedure with the circus enchantress is considerably different from the tactics of the Hindu snake "charmer"; but in neither exhibition is hypnotism employed, nor are the snakes drugged, as is often alleged. The circus snake-charmer employs a batch of tame constrictors that have not the least objection to being handled, while the Hindu, to the contrary, keeps his snakes wild and excitable, as will be later explained when we consider the poisonous snakes.

## SOME SNAKES ARE USEFUL

Throughout the temperate and tropical regions of the globe are species of serpents of high economic value. These are mostly the members of the largest family of snakes, the *Colubridæ*. The greater number of the non-venomous serpents belong to this family. Our familiar black snake and king snake are members of this family. In some parts

BALL PYTHON (*Python regius*): AFRICA

This small python seldom attains a length of over five feet. It receives the name from a habit of coiling up into a veritable ball. Photo by Raymond L. Ditmars



RAT SNAKE (*Coluber emoryi*): SOUTHERN UNITED STATES

This serpent receives its name from its habit of preying largely upon rodents. A great number of the snakes are thus of economic value, but a foolish prejudice is rapidly exterminating some of the most useful specimens (see pages 620 and 623). Photo by Raymond L. Ditmars.

THE POISON-SPITTING BLACK COBRA, RINGHALS (*Sepedon hæmachates*): SOUTHERN AFRICA (SEE PAGE 624)

Very dangerous, owing to a habit of spitting its venom to a distance of several feet. The Boers call it the Ringhals from the broad white bands that show on the neck when the hood is expanded. Photo by Raymond L. Ditmars.

RHINOCEROS VIPER (*Bitis nasicornis*) : WEST AFRICA (SEE PAGE 631)

Most beautifully colored of the poisonous snakes, but the bright hues are soon dimmed after the skin is shed by the reptile's habit of entering the water. On account of its semi-aquatic habits it is also called the river jack. Photo by Raymond L. Ditmars.

of the world the rodent-eating species are protected by law. Distributed throughout India is a large and active species known as the rat snake. Its useful habits are recognized in many areas. This is likewise the case with a closely related species found throughout tropical America. The creole French call the latter the cribo, and in the coastal regions, where the bubonic plague has appeared, there is a fine imposed for the killing of rat-eating snakes.

The farmers of our western States are now beginning to realize the useful habits of several species of serpents, and the writer has received letters from widely scattered areas asking about the possible propagation of a large plains reptile—the bull snake, *Pituophis sayi*.

Queerly enough we find some of the deadliest known serpents belonging to the same family as the non-venomous species. The Indian Ocean and the waters of the tropical Pacific are inhabited by a great number of wholly aquatic, veritable sea serpents that possess deadly fangs and sometimes swim in schools of countless thousands. These snakes have a paddle-like tail to assist them in swimming. They range in size from a yard to eight feet in length, and the greater number of them are vividly ringed; a few are longitudinally banded. The marine snakes form a subfamily that may be designated as a specialized offshoot of the great family containing the harmless serpents, the *Colubridæ*.

Another offshoot is the subfamily con-

FER-DE-LANCE (*Lachesis lanceolatus*): SOUTH AMERICA AND THE LESSER ANTILLES
(SEE PAGE 633)

A big "lancehead" is six feet long. The fangs are enormously developed and the bite of this snake is usually fatal unless the most approved remedies are at hand. Injections of an anti-venomous serum has been found to be most practical. The fer-de-lance is greatly feared on the sugar-cane plantations. Photo by Raymond L. Ditmars.

taining the formidable cobras and their allies. The members of this important subfamily are treacherously deceptive in appearance. Here we have an admirable illustration of how incorrect it is to believe a poisonous snake may be told by the possession of a heart-shaped head. A number of the most deadly known snakes belong to this subfamily.

The most diabolical in temper and terrible of them all is as innocent looking in bodily makeup as the typical and harmless snakes.

The New World is singularly free of such reptiles, a single genus representing the subfamily. India, Malaysia, and Africa are infested with these elapine snakes. The headquarters, however, are in Australia and New Guinea. There they constitute the great majority of serpent life. These are the only regions of the world where poisonous reptiles predominate.

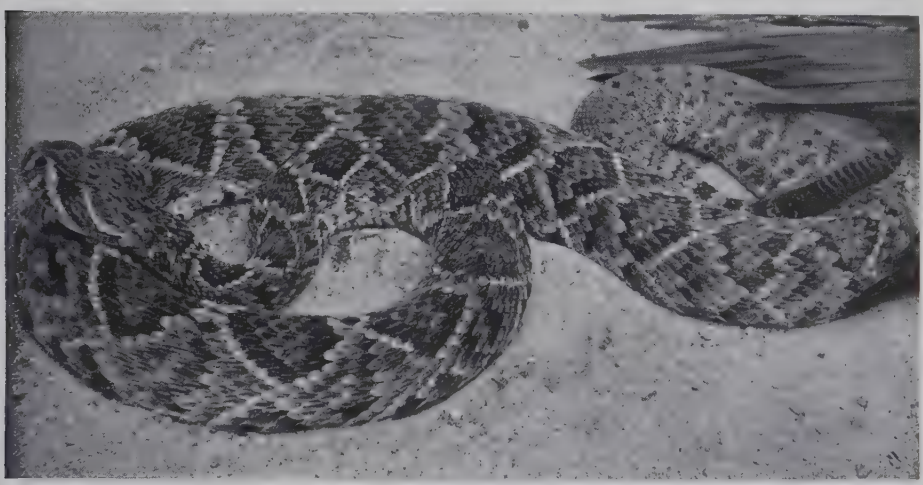
Most spectacular of the elapine serpents are the cobras, or "hooded" snakes. The genus *Naja,* of India, Malaysia, and Africa, contains 10 of these reptiles, of which the most conspicuous is the Indian or spectacled cobra. Members of several allied genera rear the body from the ground and spread the neck in similar fashion.

### THE POISON-SPITTING SNAKE

Some of the African cobras display a dangerous habit of spitting poison at the intruder. The ringhals, genus *Sepedon,* of southern Africa, is a pitchy black, exceedingly vicious cobra that receives its name from one or two broad white

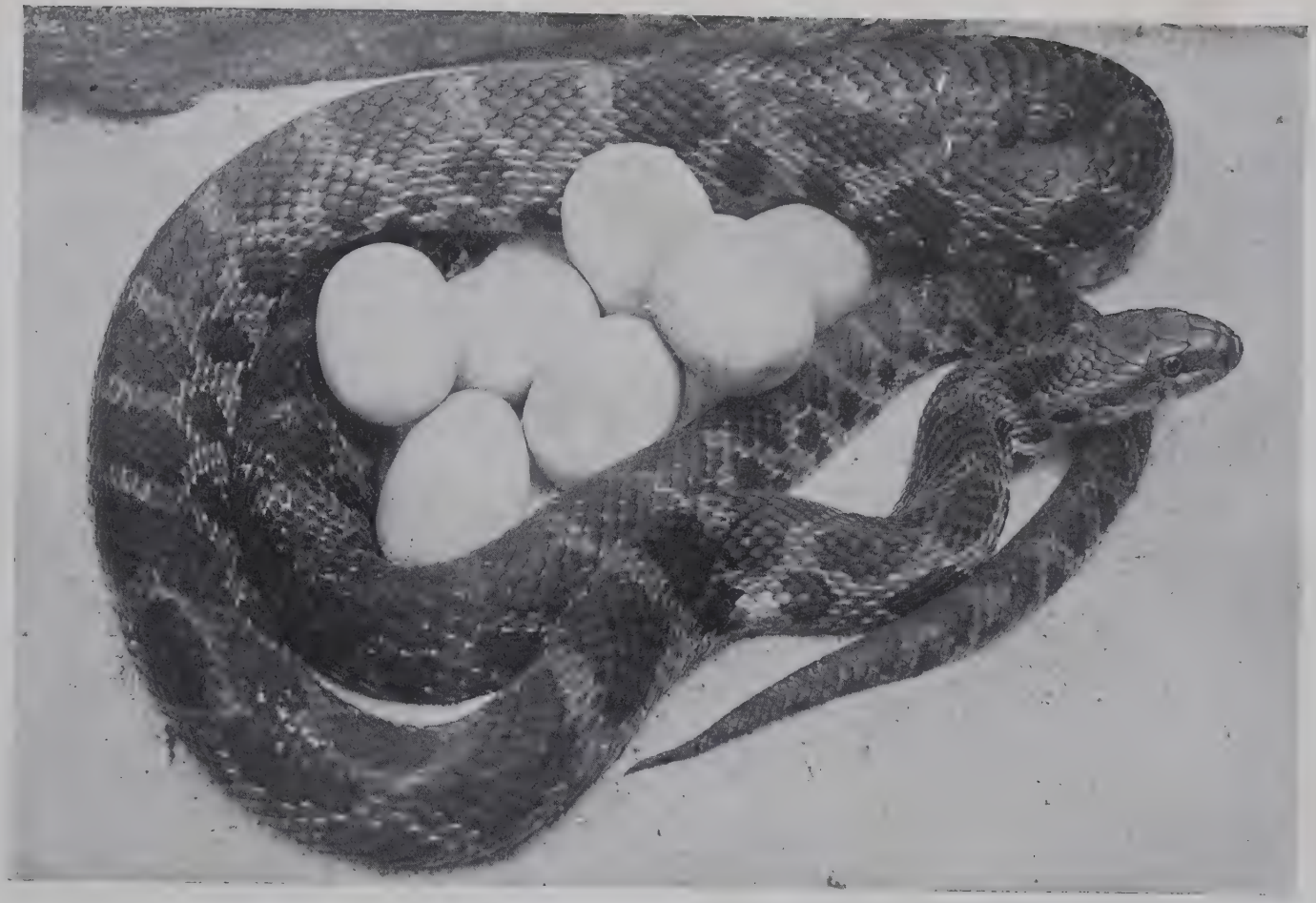
BUSHMASTER (*Lachesis mutus*) : TROPICAL AMERICA

Largest and most dangerous of the venomous serpents of the New World. Twelve-foot specimens have been recorded. Contrary to the habits of all other viperine snakes, it brings forth its young from eggs, which are deposited in damp places. Photo by Raymond L. Ditmars.



DIAMOND-BACK RATTLESNAKE (*Crotalus adamanteus*) : SOUTHEASTERN UNITED STATES

Largest and most deadly of the venomous serpents of the United States. It attains a length of eight feet, and must be rated among the most dangerous known snakes (see page 633). Photo by Raymond L. Ditmars.



FOX SNAKE (*Coluber vulpinus*) AND HER EGGS: CENTRAL UNITED STATES

The female snake remains coiled about the eggs a day or so after they are laid. Then she leaves them without further attention to hatch in about eight weeks' time. The eggs are laid under big stones or logs. Photo by Raymond L. Ditmars

bands that show on the neck when the snake is reared in fighting pose. As the snake arches its neck to glare at the intruder it is liable to eject fine jets of poison for a distance of six to eight feet. These deadly streams are dangerously well aimed.

The poison is ejected by contracting the lower jaw in such a fashion that the permanently erect fangs overlap it. At a movement of the adversary the reptile arches the neck to a degree that throws the head backward, bringing the tips of the hypodermic teeth to bear. The muscles over the poison glands are then contracted and a thin stream of venom leaves each fang. The observer is liable to receive the deadly stream directly in the eyes, and the amount of poison expended is surprising.

The writer has seen the entire lower part of a large glass panel peppered with tiny drops. When photographing or watching the antics of snakes of this kind, the writer wears a pair of auto goggles to protect his eyes. In obtaining the photograph of a ringhals which is published herewith, the front of the camera was well spattered with tiny drops of poison, as the snake became infuriated at the movements of the writer's hands in focusing.

It was this type of reptile that Colonel Roosevelt refers to in his "African Game Trails." The author says: "At this camp we killed five poisonous snakes—a light-colored tree snake, two puff adders, and two seven-foot cobras. One of the latter three times 'spat' or ejected its poison at us, the poison coming out from the fangs like white films, or threads, to a distance of several feet. A few years ago the singular power of this snake, and perhaps of certain other African species, thus to eject the poison at the face of an assailant was denied by scientists; but it is now well known. Selous had already told me of an instance which came under his own observation, and Tarlton had once been struck in the eyes and for a moment nearly blinded by the poison. He found that to wash the eyes with milk was of much relief."

### THE COBRAS OF THE HINDUS

The Indian cobras seldom eject their venom in this way. They are the most spectacular of their group, owing to the vivid markings on the "hood." With some specimens these appear like a grinning death's-head. These are much sought by the Hindu for his snake-"charming" exhibitions.

The greatest requisite of the snake-charmer is nerve, and this must be backed by a thorough knowledge of the serpents' habits. No hypnotism is employed, nor has music the slightest influence upon a snake's actions. The Hindu carries his poisonous reptiles in baskets, and, as he prepares to perform, squats down in front of these and begins a crooning refrain upon a reed. With a bamboo stick the performer removes the covers from the baskets. The cobras rear into view with dilated hoods, and the Hindu sways his body from side to side, with quickening strains upon his flute. The deadly cobras begin swinging to the music and the celebrated snake dance is on.

The actual conditions are these: The shrill notes of the reed appeal only to the imagination of the spectators. The cobra's natural attitude of defense is a graceful, rearing pose, with hood widely spread. From this position the snakes follow the swaying motions of the Hindu's body as they alter their aim in an endeavor to strike. The snake-charmer keeps just far enough away from his serpentine troop to render his bare legs safe from their fangs.

The wily fakir knows very well that if his snakes become accustomed to teasing they will "dance" with less energy. He consequently keeps a fresh supply of undisturbed specimens on hand.

Some of the more daring Hindu snake-charmers immunize themselves against the action of snake venom by taking a course of diluted injections, gradually increased in strength until the desired condition is attained. These men recklessly handle their snakes. The more clumsy fakir, who gives a less finished exhibition, is not taking any chances. He extracts the fangs from his poison-

SNAKE-CHARMERS: CEYLON

Photo from Dr. Alexander Graham Bell

SNAKE-CHARMERS IN INDIA (SEE PAGE 627)

Photo from Dr. Alexander Graham Bell

TRYING TO MEASURE A REGAL PYTHON (*Python reticulatus*) (SEE PAGE 619)

The snake is about 20 feet long. Photo and copyright by New York Zoological Society. Photo by Elwin R. Sanborn

ous snakes, so mutilating the animals' mouths in the process that they have no desire to bite. The Hindu of this type ostentatiously handles a few harmless snakes, mostly small pythons.

While the cobras and their allies must be rated among the most deadly serpents known, the venom apparatus is rather crude in its development. The fangs are small, but these diminutive venom-conducting teeth inflict wounds more speedily fatal than the enormously elongated hypodermics of the vipers, unless the fangs of a reptile of the latter kind should wound an important blood-vessel.

Among the allies of the cobras is a number of dangerous snakes that evolution has handled in an incomprehensible manner. The species of *Doliophis*, of Indo-China and Malaysia, are inoffensive in appearance, but remarkable in having enormously developed poison-secreting glands, which, instead of being confined to the head, extend a third the length of the body. This extraordinary development has pushed the heart farther down the body than with any other snake.

### THE VIPERS

In strong contrast to the graceful elapine poisonous snakes, the members of the viper family are thick-bodied and forbidding in appearance. Africa is the home of the typical vipers, and a number of these snakes inhabiting that continent are the most hideously ugly reptiles in existence. They exhibit every outline that is formidable and villainous in a snake, and are exceedingly sluggish in gait. Quite incongruous with the structure are their exquisitely beautiful colors and patterns.

The most widely distributed is the deadly puff adder, with its sooty-black chevrons separated by cream-colored crescents. This snake hisses viciferously when disturbed. It lies in brushy places in watch for rodents. A dart of the head seals the fate of the victim, which, pierced by the terrible fangs, seldom utters as much as an agonized squeal. Colonel Roosevelt quotes several observations of this snake during his recent trip.

Near allies are the rhinoceros viper and the gaboon viper. The former is gorgeously colored, after shedding the skin, in a fantastic pattern of rich blue, yellow, carmine, and green. Being semi-aquatic, its skin is soon soiled by muddy waters; and, with the pattern hidden, the bloated body and horned head make up a most forbidding combination.

The gaboon viper ranges over the whole of tropical Africa. The body is exceedingly thick, stub-tailed, with a huge, spade-shaped head. The purplish markings form outlines like a chain of hour-glasses, and the silvery white eyes glare in vivid contrast. Instead of progressing in ordinary fashion, this reptile throws forward lateral loops of the body and moves along in an oblique direction to that in which the head is pointing. A captive specimen displayed the trait of striking backwards.

This same example was a voracious feeder and on one occasion swallowed not only its own portion of rats, but those intended for its cage-mates. It was discovered in the morning so gorged that it was unable to entirely engulf the last rat it had eaten, and the tail of which was protruding from the viper's mouth. The snake appeared quite content to await developments; but, rather than have the reptile's gluttony cause its death, the writer withdrew two of the rats with a pair of forceps and the serpent quietly coiled up to digest the remainder.

No species of true viper inhabits the New World. The viperine snakes of the Western Hemisphere belong to a subfamily of the vipers, which is technically known as the *Crotalinæ*.

These are pit vipers, so called from a mysterious organ between the eye and the nostril. The pit appears to perform some important function, as it is lined with a network of nerves and there is a large nerve-lead connecting it with the brain. It has been alleged to be an organ of a sixth sense, but as man lacks the same, it is difficult to imagine what this should be. The rattlesnakes, copperhead snake, water moccasin, bushmaster, and fer-de-lance are typical pit vipers.

A NEWLY ARRIVED ANACONDA FROM SOUTH AMERICA (SEE PAGE 619)

She is 19 feet long. The snake is not so long as some of the big pythons of the Zoological Gardens, but is the thickest ever exhibited in the New York Zoological Park. She is 36 inches in girth. Photo and copyright by New York Zoological Society. Photo by Elwin R. Sanborn.

THE RATTLESNAKE AND FER-DE-LANCE

The most dangerous snake of the New World is the big bushmaster of tropical America. This pit viper appears to represent the ancestral stock of the rattlesnakes. It grows to be 12 feet long and the tail is armed with a long spine. Other species of the genus to which it belongs, *Lachesis*, are very deadly. Best known among them is the fer-de-lance, common on the mainland of South America, but also abundant in some of the islands of the Lesser Antilles. While this serpent is alleged to posses a diabolical temper, it is not particularly vicious, and captive examples become far more docile than many other poisonous snakes.

The most dangerous North American serpent is the big diamond-back rattlesnake of the southeastern United States. Eight-foot specimens are not rare, and, armed as it is with fangs that with a six- or seven-foot specimen are an inch long, this burly brute must be rated as among the most dangerous snakes of the world. Thirteen distinct species of rattlesnakes inhabit the United States proper. If they are all considered under the general head of "rattlesnakes," we may say that four "kinds" of poisonous serpents inhabit this country, thus: The water moccasin, copperhead snake, rattlesnake, and coral snake. The latter is an elapine species, an ally of the Old World cobras.

As poisonous snakes are not at all partial to cultivated areas, and the human inhabitants of this continent don't go about bare-legged, accidents from snakebite in the United States are exceedingly rare.

# THE INDIAN CENSUS OF 1911

By John J. Banninga, Pasumalai, South India

TO COUNT 300,000,000 people inside of five hours is a task worthy of any government; yet it was done, and done well, by the government of India on the evening of March 10, 1911. From Cape Comorin on the south to the rugged hills and valleys of the Himalayas on the north, and from the mountains and deltas of Burma to the slopes of the western Ghats, every man, woman, and child was carefully counted and tabulated by an army of more than two million enumerators. To say that no mistakes were made would be assuming too much, but that the record is as accurate as that of any other country, even though the latter take months for the work, is not saying too much.

That this work could be done by men unprepared for their work and without instruction must not be supposed. In fact, for many months beforehand the government set apart men of experience who planned carefully for all the details involved. They traveled all over the country, made careful investigation into minute caste distinctions and religious differences, heard all manner of petitions from all classes of people, and appointed their army of superintendents, supervisors, and enumerators.

The country was divided into more than two million "blocks," and an enumerator was appointed for each block. Groups of "blocks" were called "circles," and several circles made a "charge." Each "block" contained not less than twenty-five houses nor more than fifty. Some weeks before the actual date of the census every house was numbered, and then the enumerator went around and made the preliminary census by making out a list of the names of all the persons ordinarily residing in the houses of his block. This list was carefully revised by the supervisor of the circle, and his lists were all checked by

Photo by John J. Banninga

A CENSUS SUPERINTENDENT AND ENUMERATORS MAKING THEIR REPORT THE MORNING AFTER THE CENSUS

A HINDU FESTIVAL

All people attending these festivals on the night of the census were counted by special enumerators. Photo by John J. Banninga

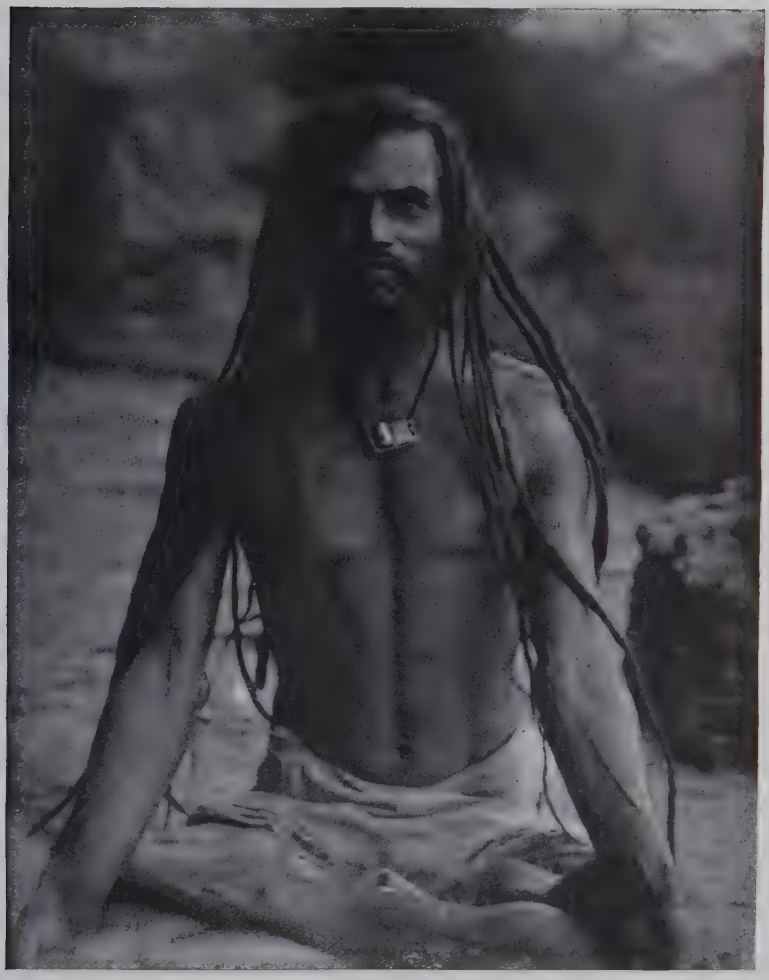
the charge-superintendent, so as to secure the greatest possible accuracy.

Elaborate provision was made for all who might be traveling by train, boat, or cart on the night of the census. Station-masters, train-guards, and others were enlisted, so that no one might escape. Thousands of Indians travel every night in the bullock carts of the country, the common mode of travel between the thousands of villages that have no railway service. The heat of the day makes the night the pleasantest time for traveling, so provision had to be made for these also; and tollgate keepers, as well as the keepers of caravansaries, were appointed as enumerators to count the noses of all passing through their gates or stopping at their "pettahs," or inns.

At 7.00 p. m. on Friday, March 10, every enumerator started out to make the real count of the people in his block. Going from house to house, he corrected the preliminary record, adding all who had come and striking off all that had gone since the first count was made. Then details as to sex, marriage, profession, age, religion, language, etc., were recorded. In all, sixteen columns had to be filled in regarding each individual. Some of the people seemed to think it a joke if they could manage to have some in their house escape the eye of the enumerator. Children had to be dragged from dark corners and older persons from the cattle sheds, in order that the list might be made complete. If any one escaped entirely he was the hero of the day in his village the next morning.

A ROADSIDE SHRINE IN INDIA

Photo by John J. Banninga



A WANDERING MENDICANT

Over 4,000,000 holy men wander from temple to temple in India, and special provision had to be made to count them. Photo by John J. Banninga

Only preliminary results are in as yet. But there is enough to indicate the growth that has taken place in the cities and in the country at large. Most of the cities show decided gains, some as high as 20 per cent; but, on the other hand, a few show losses. Bombay reports a loss of 4,930 from the number reported in the municipal census of 1906. This is accounted for by the removal of several cotton mills from the city. Calcutta reports a gain of 109,000; Madras now has 517,335 inhabitants. Plague and famine are two of the factors that enter into the explanations for the losses in several cities. As was to be expected, fertile districts have made larger gains than others. Irrigation has helped sev-

eral districts to increase their population. Madras Presidency reports a total gain of 8.3 per cent, as against 7.3 per cent for the previous decade. As in other countries, cities have gained far more than rural communities.

The *Madras Mail* reports the following interesting incident: A detailed census of the inhabitants of the Nicobars was made for the first time this year. All the people of the islands were enumerated except the Shom Pen, a wild, irreclaimable tribe in the center of the islands. It was feared that no census could be taken of them, but by a fortunate coincidence the people themselves supplied the information upon which a fairly accurate estimate could be made. Just before the census party arrived at their island they had sent a message to the people living on the coast, saying that they were intending to attack them. These tribes, being friendly to the English, handed over to them the two tally-sticks on which notches had been cut to show the number of the attacking party. Notches had been cut to show the number of fighting men in each settlement, the settlements being divided off by lateral notches.

One of the enumerators discovered a marriage party at one of his houses, and instead of the six persons reported in the preliminary survey, there were now over a score. In another village there had been a large fire and a whole section of the town was burned down, but the people were found in improvised sheds not far away, and were counted as if nothing had happened.

Plague and cholera accounted for many decreases in the number in any given house. A few days before the census three bodies were carried out of one house in Madura as a result of cholera. In the plague-affected areas whole districts in the cities were depopulated and the people required to live in booths and tents outside the city.

In some places the enumerators had great difficulty in getting men to give the names of their wives, or wives those of their husbands. It is considered unlucky to speak the name of one's helpmeet in this land.

The crowding of some of the wards of the cities is illustrated by the following story from Bombay: An enumerator found a building with 150 rooms, in each of which thirty people were living. Another building, a kind of improved tenement, in each room of which four people were supposed to live, was found to have an average of thirteen in a room. The enumerator was asked in this case to act the part of a confidential friend and report only four to a room. The homeless and wanderers, in which each city abounds, were gathered together in suitable places where the necessary details were taken.

The final returns will be awaited with a great deal of interest. All the sections of the community will want to know how they stand with reference to the last census. The Christians then rejoiced in a 28 per cent gain. Have they made as great progress in the last decade? The Hindus lost in the closing decade of the last century. Have they made up that loss or not? The past has been a decade of wonderful progress in politics and commercial affairs, and all will look eagerly to the disclosures of the present census to see what bearing the figures gathered may have on these subjects. It may take a year before the final returns are published, but when they appear they will have significant facts to relate to those who know India and her people.

Photos from U. S. Department of Agriculture

CORNFIELD ON A DEMONSTRATION FARM, SHOWING A SCHOOL FOR FARMERS ENGAGED IN SELECTING CORN

CORN DAY AT MONROE, N. C., SHOWING TWO HUNDRED FARMERS SELECTING AND TESTING CORN FOR PLANTING (SEE PAGE 641)

SAMPLES OF CORN SELECTED BY FARMERS FOR SEED

The ears on the right are those selected by farmers in a territory in which no demonstration work has been done. Those on the left were selected by farmers in a territory where demonstration work has been conducted one year. Photo from U. S. Department of Agriculture.

From Yearbook, Department of Agriculture, 1909

HOW TO MAKE A FARMER: THE BOY WHO GREW THE CORN SHOWN IS STANDING IN HIS DEMONSTRATION PATCH

## BOYS' AND GIRLS' AGRICULTURAL CLUBS

THERE have been few developments in recent years of greater educational interest and value than the work done by associations of boys and girls in agricultural and domestic-art undertakings. As a rule these have had their beginning in some form of competitive contest for special occasions or awards. Thus we find clubs for corn growing, cotton growing, potato growing, fruit growing, poultry growing, livestock study, bird study, home culture, and high-school improvement. All of these have been more or less agricultural in their general character.

To any who are unacquainted with the nature of such clubs, it may be explained that a corn-growing club is an association of boys, who enter into a competition to determine which can grow the most or the best corn on a certain area of ground under definite rules of planting, cultivation, and exhibit of their product. A cotton-growing club would undertake a similar competition in producing the best yield of cotton under prescribed conditions. For girls these contests have frequently taken the form of bread making, sewing, or joint contests with boys in gardening or poultry raising.

The members of such clubs have been led to observe more closely; to recognize good and bad qualities in the products they have grown, and in the insects, fungi, and other various conditions affecting their work. They have learned something of the value of labor, the cost of production, and the keeping of simple accounts with different farm and household affairs; they have been encouraged to read good literature, and have learned some of the sources of good agricultural literature.

They have learned the value of organized effort, of co-operation, and of compromise; and the social instinct has been developed in them—a matter of great importance in rural districts, where the isolated condition of the people has long been a great hindrance to progress.

The influence upon the communities at large—the parents as well as the children—has been wholesome. Beginning with an awakening interest in one thing—better seed corn, for example—communities have rapidly extended their interests to other features of rural improvement.

A PRACTICE CLIMB, SEVEN AND A HALF HOURS: THE UNTERGABELHORN, 11,150 FEET (SEE PAGE 647)

This was the second day's climb. The first was the little Riffelhorn, 9,617 feet, over whose top rises the steep Lyskamm. Note the funniculaire to the Gornergrat, and over it Monte Rosa. To its right can be seen our route up the latter, all except the steep rock ridge, and on its long slope the descent by the usual, easier route. Photo by A. G. Wehrli.

# A WOMAN'S CLIMBS IN THE HIGH ALPS

By Dora Keen

*With Illustrations from Photographs by the Author and Others*

CLIMBING in the High Alps in a bad season may mean exhausting rock work, at times very much lengthened and complicated by a covering of snow. It may mean very fatiguing or dangerous experiences on snow and ice, or sudden storms, with peril of freezing to death or of losing one's way, or there may be various thrilling combinations of experiences.

The Alps are not, however, to be named with what may be experienced in higher mountains in other lands; for when very hard work has to be done at very high altitudes, or is combined with problems of intense cold, a jungle base, an exhausting approach, or two or more of these conditions combined, the difficulties of mountaineering become enormously complicated. The Alps present no such problems.

They are not to be compared with the brilliant achievements of such spirited and versatile explorers as the Duke of the Abruzzi and others, in the Himalayas, in Alaska, in Africa, in the Andes, and even in the Caucasus. My story of two short seasons in the Alps is therefore presented in all modesty, with no claim to have done any more than others under like conditions, and no space to try to make the reader feel the call of the mountains, to dwell on why it all pays.

The High French Alps, in the region of Chamonix, Haute Savoie, and Dauphiné, and the Swiss peaks about Grindelwald and Zermatt, present about as difficult actual mountaineering work, I believe, as has yet been attempted anywhere. Especially is this true when bad weather makes the condition of the mountains such as it has been for the last two summers. This is the way that I know them; for what serious mountain climbing I have done has been done during a month at Zermatt, in 1909, and a little less time at Chamonix, in 1910.

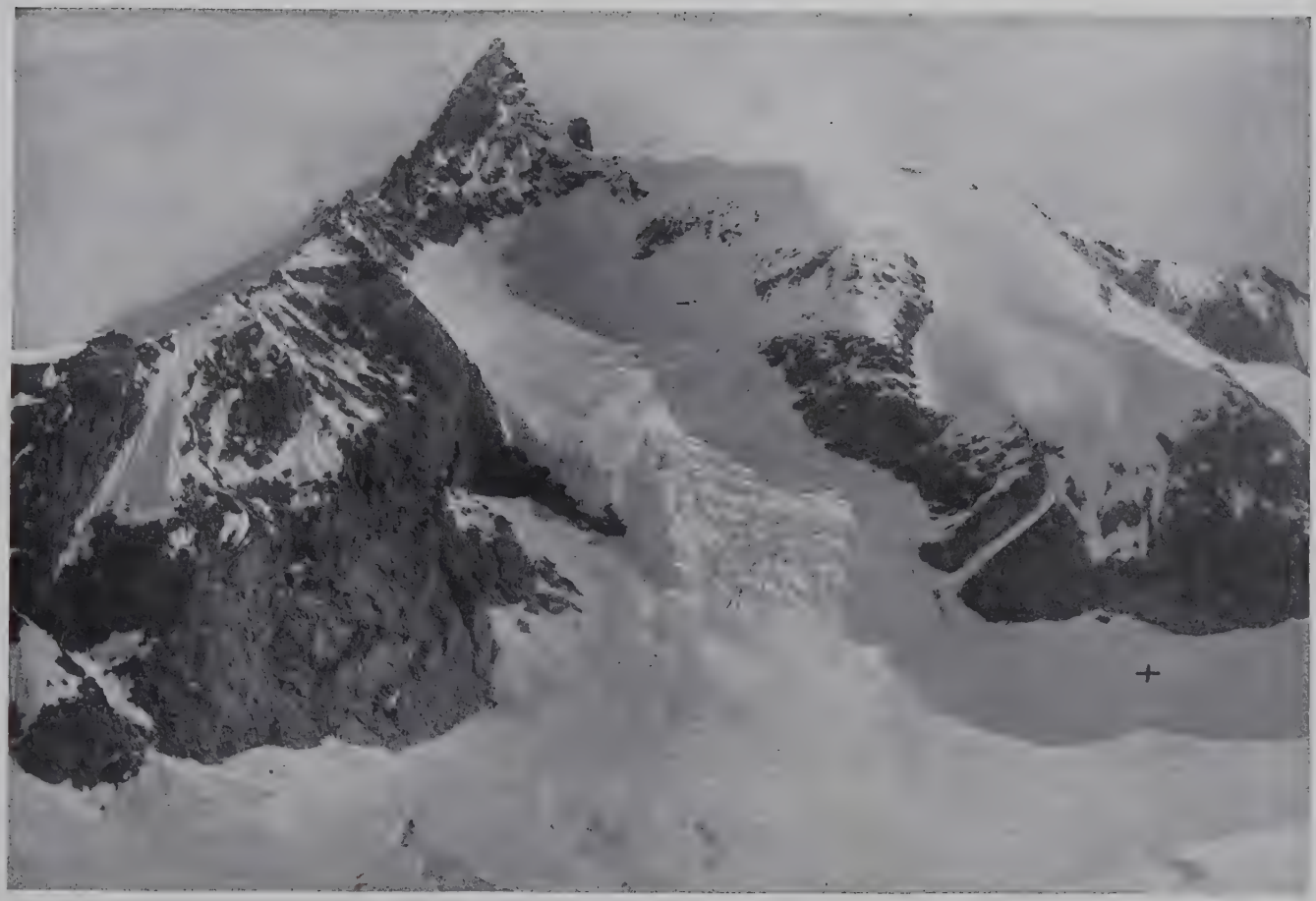
### WHY I CLIMB

To those whose love of sport and adventure need not yield before considerations of time and cost, the little explored peaks of distant Asia and other lands, and even the Canadian Rockies, of course have greater charm, since in those regions are lofty and difficult mountains that have not yet been climbed. To me, however, mountain climbing is a sport that is worth while in itself—to those who enjoy it—apart from any question of fame or of new achievement. My objects have been neither.

I climb for pleasure, for the wonderful views and the vigorous exertion, for the relaxation of a complete change for mind and body, and because of the inspiration to the spirit. To combine exploration with mountaineering must, no doubt, so increase the interest as to well repay the augmented difficulties. All I would emphasize is that to climb anywhere repays the effort, even if it must be within reach of civilization and where others have gone before. To me there is ample reward in the uplift of the spirit; in the moral discipline, the keen interest, and the training to think, of a hard battle carefully planned; in the satisfaction of a love of adventure, and in the invigorating physical exercise.

### CLIMBING FACILITATED IN THE ALPS

The Alps are accessible, far more accessible as yet, even to Americans, than are the finer peaks of America. Railways, villages, and huts make approach to their very bases easy. No extensive and expensive camping outfit is required. Food and clothing do not have to be carried great distances by porters or mules, and shelter from cold at night or from



THE ZINAL ROTHORN, 13,855 FEET, CLIMBED BY ITS RIGHT SNOW RIDGE AND LEFT SUMMIT SLOPE (SEE PAGE 647)
It was my first peak of first class, a 13-hour day. The cross shows where a caravane had fallen from the slippery ridge. Photo by G. P. Abrahams

sudden storm may be found in huts at the base of all the principal peaks.

The large membership of the Alpine clubs—sometimes 20,000—furnishes them with the means to erect and maintain huts or cabins at such points as they may be needed, but where private enterprise would not find sufficient inducement. The highly specialized business of guiding mountain climbers is also under their direction. They license the guides and porters and fix the rules and tariffs for their direction; for, unlike the English and American Alpine clubs, the Alpine clubs of Continental Europe are not, for the most part, limited to those who have made mountaineering records of a certain standard. They are made up chiefly of members who desire to encourage the sport for its own sake and also as a method of attracting tourists.

In the course of travel, a love of exercise and adventure had given me a few easy experiences in the mountains. They began as a child in the Adirondacks and the White Mountains, were continued in the Selkirks of Canada, in Norway, and the Dolomites, and finally in the Andes. To climb the Matterhorn gradually became a dream, and quite unexpectedly, in August, 1909, I found myself within reach of it at the right season and with time to get in training. So to Zermatt, German Switzerland, I went.

At the head of a smiling valley, itself 5,315 feet above sea level, towers the mighty Matterhorn, its isolated grandeur dominating the scene from every point. By means of a funiculaire, even those who do not climb may here behold the "panorama grandiose" of these finest peaks of the Alps, and as they gaze, from its center the commanding ridge of the Gornergrat, rising as it does 4,975 feet above Zermatt, in the very heart of the High Alps, even the least imaginative traveler feels the inspiration of the scene. It is a complete amphitheater of snow, ice, and rock peaks. But to him who has mounted thus easily it is not given to know the joy of the mountaineer, the feeling of triumph and exhilaration in such a spectacle. To him it means most, since to him it has cost something—in the way of effort, and difficulty, and anxiety—to attain the summit from which he fain would gaze.

To climb requires a good heart and endurance. The rest comes with experience. The technical problems have all been solved by the earlier adventurers. A gradual training of the muscles is best, in order that they may not get too tired, and for the feet, in order that they may not blister. Two hours on a steep path the first day, five the next, nine the next, and after that almost anything—that is all the training it requires to make ascents lasting anywhere from 12 to 19½ hours, as most of the serious ones do, without any bad effects.

One goes up a path to the base hut or cabin two to five hours above the valley, the afternoon before, is asleep by 8 p. m., gets up at 1 the next morning, and starts at 2 a. m. The early start is in order to have plenty of time to get off the mountain before night, and also to have the snow in good condition. That night one has a long sleep comfortably in the valley, and the next day wakes up fresh and ready for the afternoon's walk to the base of another peak. Bad weather interrupts the program often enough to afford variety and respite, or, rather, the climbing affords a relief from the frequent bad weather of the high mountains.

### ZERMATT

Of the ten ascents that the weather permitted of my making at Zermatt, only four could be of "first-class" peaks, for the high and difficult rock climbs are dangerous when covered with excessive amounts of soft snow, and even when I arrived an unusual quantity of the winter's snow still remained on the mountains. The four first-class ascents were the Zinal Rothorn, Monte Rosa, the Weisshorn, and the Matterhorn, and with these only does space permit me to deal.

My first four climbs were in preparation for the Matterhorn, but on the day

LOOKING AT OUR ROUTE UP THE RIMPFISCHHORN, 13,790 FEET (SEE PAGES 651-660)

Its ascent resembled that of the Wellenkuffe. Going on after this 11-hour ascent to the base of Monte Rosa, by the route indicated in the lower line, made a 16½-hour day, and the next day we climbed Monte Rosa. The arrow shows where to go for water. From the Weisshorn hut, 9,380 feet. Photo by A. G. Wehrli.

that I was ready to start for its base there came a bad storm, which made this ascent quite out of the question for a time, and so it continued for three weeks. Not in years had it been so white, so perpetually white, for bad weather continued to come about every third day. When for a day or two the sun shone again, other ascents would become possible—the lower and less steep rock ascents, the snow mountains, even the Weisshorn, but not the steep and lofty Matterhorn.

THE RIFFELHORN, 9,617 FEET, 5 HOURS*

The little Riffelhorn (see picture, page 658) was chosen to begin on, just for a little rock practice, and for my guide to judge what training I needed. Even from its harder side it meant only 40 minutes of real effort, roped to one guide.

THE UNTERGABELHORN, 11,150 FEET, 7½ HOURS

The next day came the Untergabelhorn (see picture, page 642). This likewise was climbed by its harder side, from the Trift Hotel, and one bit was difficult; but even so it required only one guide. A hailstorm overtook us as we approached the jagged rock ridge, making it cold and slippery work. Three guideless gentlemen below, although ascending by the easier route, turned back. Because of the route and the storm, we were four hours from the hotel to the top.

After the first grassy slopes and gravel—for all ascents begin way above timber line—came a "couloir", or gulch, in the rocks filled with snow and débris. Mounting directly up it, we gained the rock ridge which we were to follow to the top. Going by this route, at one point on the ridge was a rock slab that slanted down rather steeply and connected with the next high point only by a crotch at one of its lower corners. I had to lie on my back and slide down it six inches at a time for 15 feet, fearful of sliding off into space, yet secured by the guide from above as he carefully let out the slack in the rope. He followed, with no one to hold him, stepped over my head, while I sat astride the crotch hugging the rock overhead, and climbed up it 20 feet perpendicularly above me, I following.

THE WELLENKUPPE, 12,830 FEET, 8 HOURS

The Wellenkuppe (see picture, page 659), four days later, proved more interesting, colder—for it was higher and a snow summit—but not much longer, because less rock work. Only below its summit were there any rocks, but there was much snow on them and my feet became numb. The snow-covered Trift Glacier had to be traversed, both going and coming. Two guides were therefore necessary, for safety dictates that there should never be less than three persons to cross a glacier. If one should fall in a "crevasse," or crevice, the weight of the other two would more than balance the drag on the rope and enable them to pull him out.

THE ZINAL ROTHORN, 13,855 FEET, 13 HOURS

At the worst point on this easy Trift Glacier (see picture, page 644), jutting rocks at one side led the eye up to a steep slope of snow along whose crest lay the route to the difficult Zinal Rothorn.

"It was here that Mr. —— and his guide were killed," said my guides, pointing out to me the spot on the ridge where he had slipped and had dragged his guide down the slippery snow and over the cliffs, to be dashed to pieces on this glacier far below. This was my next climb, two days later, so I took care to have guides who knew their business and could be trusted to hold me if I slipped.

The ascent of the Zinal Rothorn took half as long again as the Wellenkuppe, 6½ hours from the Trift Hotel to the top, for instead of a level glacier to cross,

* The number of hours given for each ascent indicates the time from the base, where the start is made on the morning of the ascent, to the summit and down again all the way to the place where that night is spent.

BETWEEN THE RIMPFISCHHORN AND MONTE ROSA WAS A VAST EXPANSE OF ICE AND SNOW

It was like a beautiful billowy sea, with clouds covering Italy beyond. Photo by Dora Keen

there is first a tiresome moraine, then a steep snow slope, then snow-covered rocks, on which the early morning cold was so great that we could hardly stop long enough to eat, and finally the real work of the long snow ridge and the snow-covered rocky summit. To me the snow ridges are the worst part of mountain climbing. So long as I have rocks to hold to I do not mind how perpendicularly I look down; but it is an unsteady feeling to walk along a ridge-pole of snow where one's foot may easily slip, and where the only aid to balance is an ice-pick that may also slip as one leans on it.

The rocks at the top of the Zinal Rothorn also require care. Twice my leader said, "Here is where Mr. So and So was killed"; and again, "Here Mr. So and So and his guide slipped and were killed," to which my reply was always, "Then hold the ropes well for me," and always I had the comforting thought that with care and roped between two good guides one light tourist could hardly cause the entire "caravane" to fall.

At one point were steep slabs with no handholds. Over them one must pass with scarcely any footholds, and these almost too far apart for my reach. Around a corner, too, they went. At such points only one moves at a time, and the others hold on tightly until he has reached a place where he in turn can brace himself while the next person moves. This is one reason why it takes so long to make a difficult ascent. At

OUR ROUTE DOWN FROM THE TOP OF THE RIMPFISCHHORN

It can be traced on the snow to the guide, who is holding the rope for the descent of a caravan ahead. On the rocks over his head is the base cabin of Monte Rosa, reached 11¼ hours later, for the 13½-hour ascent the next day. Photo by Dora Keen.

another point we had to climb around a bulging rock that projected over a precipice of at least 2,000 feet.

### BAD WEATHER INTERFERES

The Rothorn was my initial first-class peak. I was to start for the Matterhorn the very day after, a week after reaching the mountains, but I was too late. Hard rain below—which means deep, fresh snow above—suspended all climbing for three days, and for the next three weeks there were never enough consecutive days of sun to melt the snow on this high peak.

With so much snow on it, none of the guides would attempt the Matterhorn, for, aside from the danger of slipping on such steep slopes, the labor of cutting the many steps over the snow to such a height is enormous, and the time required to cut them would so prolong the ascent that the caravane might not get down by daylight, and might be frozen to death on the mountain.

As I was preparing for the long strain

OUR ROUTE UP MONTE ROSA, AS SEEN FROM THE TOP OF THE BREITHORN, 13,685 FEET

The five-hour walk up the long Grenzgletscher, by darkness and dawn, was the most beautiful I have ever had. A cross indicates the summit (see page 651). Photo by A. G. Wehrli

on the arms that is the main difficulty on the Matterhorn, rock climbing was my object; but when fresh snow ruled out the higher and harder rock climbs, the snow climbs could be made and were at their greatest beauty. Always possible in good weather, they became only more fatiguing after a storm, when one must toil up through snow that was deep and soft instead of hard and smooth. I emphasize what bad weather conditions mean, because it is often the conditions that make a mountain easy or hard, safe or dangerous, and also because it was the exceedingly bad conditions that made the ascents of the harder peak at Chamonix the next year so very much worse than these at Zermatt.

As soon as it cleared I set out for the two successive ascents of the Rimpfischhorn and Monte Rosa, passing directly from one hut to the other.

THE RIMPFISCHHORN, 13,790 FEET, 16½ HOURS

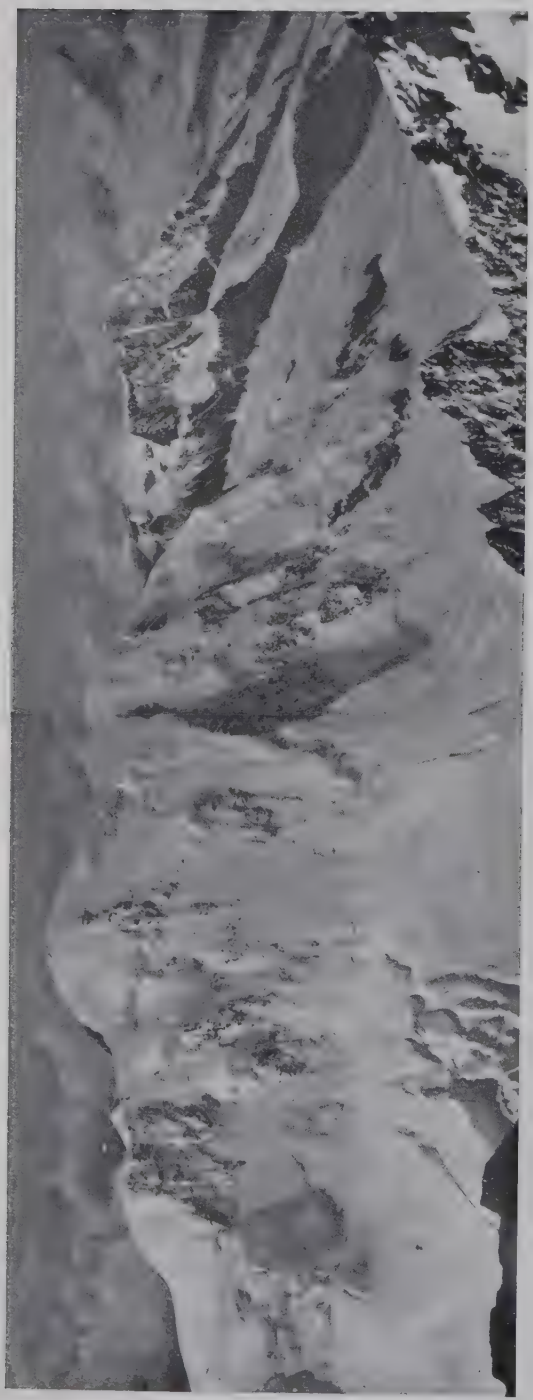
The Rimpfischhorn (see pictures, pages 646 and 649) was similar in character to the Wellenkuppe. It was a little longer, a little harder, and, owing to its position, the near views from it were much finer, for it directly overlooks the billowy masses of snow and ice that lie between it and Monte Rosa (see picture, page 648). The first bit was troublesome, since, unlike the beginning of most ascents, we had to make our way for three-quarters of an hour up and down among huge boulders, where it was hard not to fall, with three people lighted only by a one-candle lantern. Coming after the Rothorn, its snow fields and snow-covered rocks of moderate steepness and difficulty did not seem hard. Starting at 2.30 a. m., by about 1 p. m. we were back at the little base hotel, and at 2 o'clock off again over the Findelen Glacier and across the Gornergrat for the cabin at the base of Monte Rosa. Five hours and a half it took us to reach it, and brought us in rather tired, for my guides had never done this before, and to gain the Gornergrat had meant finding a way without a path, for two long hours jumping and climbing up and down amid a succession of great rock falls.

MONTE ROSA, 15,217 FEET, 13½ HOURS

After this 16½-hour day, an hour of sleep on a mattress on the floor in the servants' room—and the kitchen floor for my guides—was all we could get, since it was 7.30 p. m. and the cabin was already full, 45 people seeking food and lodging in space intended for 15. It was therefore with a little misgiving, because of weariness, that I started again at 2.30 a. m. for a very high summit, to which we intended to climb by its much harder and steeper rock side.

The usual route up Monte Rosa takes five hours up its long snow slope as far as "the saddle," and thence 1½ hours up the rock ridge, or west "arête." "*Très déchirée,*" very jagged, Baedeker well calls this ridge, but its slope is gradual. The ascent by this route is much easier and less steep than by the harder southwest side, which we had chosen; but it is exposed to the north wind, and because of the height and the long time on the snow, there is danger of freezing a hand or a foot. Snow climbs are far more beautiful than rock climbs, but they are less difficult and less varied, and therefore considered less interesting. For the sake of protection from the north wind, and because it would be more interesting, we had therefore determined to go by way of the long Grenzgletscher, the glacier that rises on the boundary crest of Monte Rosa, and then directly up a rock ridge as hard and steep as the Matterhorn (see picture, page 650).

Hour upon hour we mounted this most beautiful glacier that I have ever seen. Its huge, bottomless crevasses, its pure white mantle of snow on which, by their lanterns, could be followed three caravanes ahead and three behind, bound for other points, filled me with wonder. At our right rose the terrifyingly steep slope of the Lyskamm (see picture, page 652); up ahead of us an immense expanse of snow and ice broken only where crev-



THE SNOWY LYSKAMM, MOST BEAUTIFUL OF ALPINE HEIGHTS, WAS SUPERB BY THE DAWN'S EARLY LIGHT
Beyond is the Breithorn, over whose top appears Mont Blanc, far away above the clouds. At the right, the Matterhorn. From near the top of Monte Rosa. Photo by Dora Keen

asses had ruptured. At our left were the snowy rocks of our peak above, far across the great Matterhorn, the Dent Blanche, and even the tip of Mont Blanc, far away. These, indeed, were sights to give joy to the eye and wings to the imagination, and on it all gradually, as we rose, came the changing lights and colors of the long dawn and the first rays of the sun.

At the base of the ridge, at 7.30, we breakfasted. For two hours it had been bitterly cold, and although we climbed up to a point where the sun's warmth might strike us before even this brief stop, and I kicked my feet against the rocks at every step, still for the whole of the next hour they were so persistently numb that one of the guides had to work over them.

So long and exhausting did this ridge seem that I remember, after an hour and a half of it, looking up in silent despair. I saw that it would take me at least an hour more to reach that far glistening summit, towering as it did almost directly overhead. I wondered whether I should reach it, or whether fatigue, cold, or altitude would compel me to give it up. But once on top of Monte Rosa, I forgot the cold and effort and felt it to be the most beautiful climb I have ever had; for, almost the only time in my experience, on this high summit there was little wind and sufficient time and warmth for an hour of enjoyment and rest.

Photo by G. P. Abrahams

A SLIPPERY BUT NOT DIFFICULT CROSSING

THE DANGEROUS ITALIAN SIDE OF MONTE ROSA, BY WHICH THE LOST CARAVAN HAD ASCENDED

They were bound for the Nordend, at the right. The highest point is next, the Dufourspitze, from which I watched the search-party climb to the Nordend and look over. Photo by A. G. Wehrli.

THREE CARAVANS ON THE BREITHORN PLATEAU

Those nearest are seated on ice-axes breakfasting. The ascent is all snow, and easy, but it was so cold that three out of twenty caravans turned back because of freezing feet. Photo by Dora Keen.

Down by the usual route took us only two hours and a half. That is the difference between a snow mountain, where one can occasionally run or slide, and a rock summit, down which one must climb with care, which takes time. To reach the saddle was an hour's descent, and extremely distressing to me, for the rock ridge from the summit to that point, although not to be compared for steepness to the one by which we had ascended, was very narrow. It consisted in a series of rock points between which one must descend steeply on the crest of deep snowdrifts, which sloped sharply away on one side, while on the other was a precipice.

Below the saddle, however, we fairly ran down the snow slopes in the broad track of the seven or eight other caravanes that had already gone up and down again by this easier route. Running and sliding in the deep snow that a noonday sun had by this time thawed, leaping over the crevasses on the way, in an hour and a half from the saddle we were down at the cabin. I was panting and perspiring, but not tired now, and my guides were exultant when they found that the only other tourist that had gone by our route, although he had done nothing the day before, lay asleep, exhausted.

### THE BREITHORN, 13,685 FEET, AND THE LITTLE MATTERHORN, 12,750 FEET, 10 HOURS

More snow made it necessary to wait in the valley again now for three days, and then to content ourselves with the Breithorn, which was a short and very beautiful snow climb. The ascent of

THE DIFFICULT WEISSHORN

Leaving the hut at 2.30 a. m., by full moon, we needed no lantern. Monte Rosa and the Matterhorn rose far away like specters. Just as we stopped for breakfast, at 6 a. m., the sun rose. From there up (see cross) the "gendarmes" took two hours, and two more up the snow cornice to the top (see page 660). Photo by Wehrli, Kilchberg-Zurich.

IT WAS DOWN SUCH A SNOW-SLOPE THAT I FEARED TO SLIP IN DESCENDING FROM THE SUMMIT OF THE WEISSHORN, 14,804 FEET

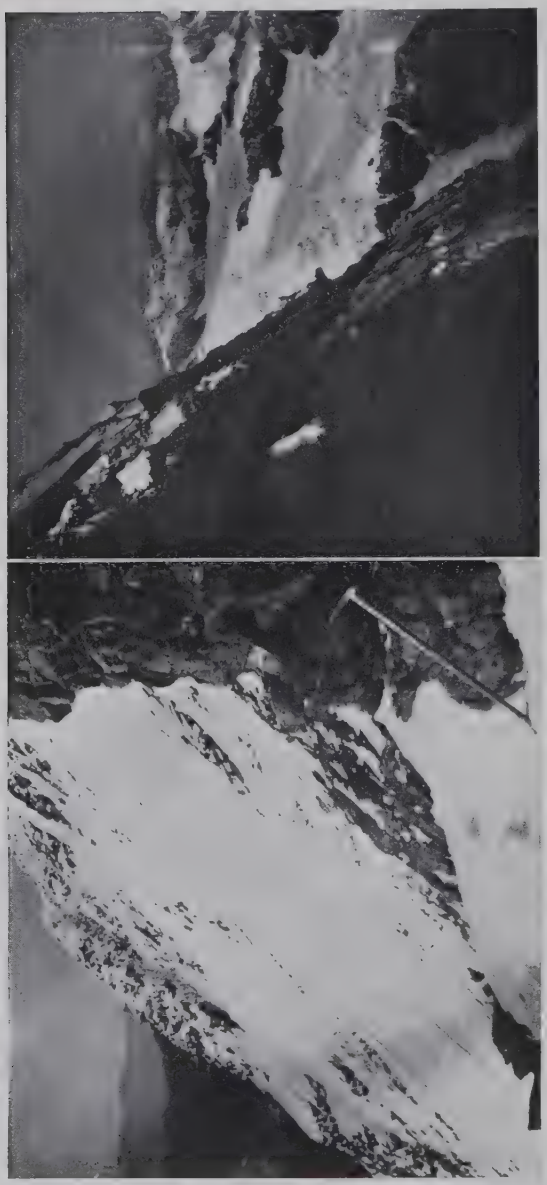
This is the Obergabelhorn, also a difficult ascent. Its ascent is made by the left ridge. The southern side is bare and steep. Another view of the Obergabelhorn is shown in panorama of the Matterhorn, page 659. Photo by A. G. Wehrli.

THE MATTERHORN AS WE HAD IT—A MASS OF SNOW: AT ITS RIGHT THE DENT BLANCHE (SEE PAGE 661)

Our ascent of the Matterhorn was from the Schwarzsee Hotel, at the end of the grassy slope, up the right ridge to the summit, and down again. It took 19½ hours, because of the snow, and 16½ were hard work. In a month I had progressed from the little Riffelhorn, seen over the men's heads as it rises above the Gornergletscher, to this. Photo by A. G. Wehrli.

THE SUMMIT OF THE MATTERHORN IS A RIDGE-HOLE

It was a cornice of snow the day of our ascent. Note the dominance, and how steep are the rocks between the shoulder (the white patch on the left ridge) and the top. The ropes are there (see page 663). The Obergabelhorn (right) shows the difference between the north side of a mountain which is snow-covered unless too steep—and its bare southern side (see also 648). Dotted lines indicate our route up the Wellenkuffe (see page 647), whose snow-cap is always recognizable from the Trift Glacier, with very little snow. Photo by G. P. Abrahams.



ON THE RIDGE OF THE MATTERHORN: THE TWO FACES
It seemed just as steep as it looked. The snowy side was the less steep and also less cold, because in the sun, and, as far as the "shoulder," protected from the north wind. Photo by Dora Keen

this "Damenspitze," or "ladies' mountain," was cold, if easy. It was only four hours over snow to the top and most of the way at an easy grade, with few crevasses (see picture, page 655), yet three of the 20 caravanes that day turned back, because of women's feet too thinly protected from freezing. By 6 a. m. one has usually attained the final exposed ridge of any mountain, and the chilling sunrise breeze is apt to make the time from 6 to 8, until at last the sun begins to give some heat, an anxious time for feet or hands.

### THE WEISSHORN, 14,804 FEET, 15 HOURS

Not until a week later, after having been twice repulsed by more bad weather, once when half way up, did conditions permit me to reach the top of the Weisshorn. At its base, above the valley, stands the unoccupied hut, on a site whence the views, whether after a storm, by Alpine glow, or by full moonlight, are among the finest I have ever had (see picture, page 646). The first half of the ascent was not especially difficult; but after three hours and a half of a comparatively easy glacier, snow, and steep rock slopes, we came to a rock ridge whose steep and jagged points so effectually challenge progress that they are termed the "gendarmes" (see picture, page 656).

The Weisshorn is a few feet higher than the Matterhorn, and a steep ridge most of the way, although not as steep as the latter. It has few snow slopes of safe enough grade for a "glissade," or sliding descent, and consequently the descent, as well as the ascent, takes a long time. It is considered a very difficult climb, and with the great quantity of fresh powdery snow way down to its base, it was certainly twice as hard as

the Rothorn. Baedeker puts them both, together with three others at Zermatt—the Ober-Gabelhorn, Dent Blanche, the worst, and the Dent d'Hérens—as "very difficult (for thorough experts only, with first-rate guides)".

Because of its condition, soon after we reached the rocks it was clear that we must abandon our plan to "traverse" it—that is, to descend into a different valley by its other, steeper, side. Just to reach the top took eight hours of anxious and very fatiguing work, and a light snow-storm and clouds, which veiled all views for the last two hours, chilled us even as we toiled. In endless series the "gendarmes" seemed to rise, and to climb them was a two-hour task.

At times the only way to get up at all was for the first guide and me in turn to mount to the shoulders of the second guide. I would then stand aside while he was pulled up by the rope. This was labor, but worse yet were the last two hours, for the top is a pyramid of snow, as the name implies, and to climb its ridge meant nice judgment to determine how to go most safely between an overhanging edge or snow "cornice," which might break off with our weight if we got too far over on it, and a slope so steep on the other side that to miss a step might mean to slide to the bottom. While we were waiting for the steps to be cut we grew cold, and when we went forward I panted from the steepness.

But more anxious still was the descent from this snowy summit, for at every reach to the next step, far below, it seemed as if I should certainly lose my balance or slip. The descent of the "gendarmes" was difficult, too, but to climb down at least is no such strain on one's breathing powers as to climb up, so that to me it is always worse to go up. Finally came a couloir, or gully, in which several flying stones from a caravane behind made us take refuge under a rock until they also were down. "Killed on the Weisshorn by a falling stone" I had read two days before on a grave in the English church-yard. The Dent Blanche is called the worst climb at Zermatt, but my guides assured me that it was hardly worse—a little longer, but of the same character.

### THE MATTERHORN, 14,780 FEET, 19½ HOURS

Again it stormed and shone again, so it was September 6 before I could at last start for the Schwarzsee Hotel, two hours above Zermatt, and the next morning up the Matterhorn (see pictures, pages 658, 659, and 660). My guides urged that it would be better to wait for another day's sun to do its work, but they thought it could now be ascended safely, and I did not trust the weather. The season was now so late that I preferred harder work to the risk of not getting up at all. Eight other parties had likewise been waiting from two to three weeks, but all decided to wait another day. All the next day they watched us by telescope, and when they saw that we had succeeded they all welcomed us at the base hut, whither they had mounted, ready to profit by our step-cutting by going up on the day following.

Profit they did and had much less snow—even as we came down at night the lower stretches had melted—but for them the mountain was enveloped in clouds after 7 a. m., and I was glad that I had not waited.

One of my guides had an ugly scar from a falling stone that had nearly killed him on the Matterhorn, and this was one of my reasons for preferring to go when not many others were going. In fact, there was only one other caravane on the mountain with me, that of the president of the Swiss Alpine Club, and he had to turn around exhausted within an hour of the summit.

Under good conditions the Matterhorn is not now reckoned as presenting extraordinary difficulties to experienced climbers in good training, but it is "immer anstrengend," as the Germans say. It is always a great strain, a great test of endurance, because it is hard every minute, is very high above the hut, and takes almost as long to come down as to go up. This is the case under all conditions, and now, care and step-cutting over, so much

OUR FIRST ROCK CLIMB AT CHAMONIX, JUST FOR PRACTICE

While we were climbing this Aiguille de l'M, 9,302 feet (see page 669), and the twin Aiguille des Petits Charmoz, 9,409 feet, flitting mists gave occasional glimpses of these two lower points of Mont Blanc and of the Aiguille du Midi above. Photo by Dora Keen

snow made it much longer and more anxious.

We were 19½ hours from hotel to summit and back, and 16 of them meant continuous hard muscular effort. From 4 a. m. to 8 p. m. I was pulling myself up or letting myself down the rocks by sheer force of muscle, never stopping except a few times for a few moments to take a hasty meal or a hasty snapshot. Starting at 2 a. m. and going as fast as caution and breath would permit, it was 1 p. m. when we reached the summit and 8 p. m. when we got off the rocks. There were no easy bits and never a place to make time by "glissering"; that is, sliding erect down snow. It was a constant reach and tug, on holds that often seemed impossible for me to reach.

There is no shelter after the base hut, and this was a miserable shanty only two hours above the hotel, still 4,000 feet below the summit. An old hut two hours up on the rocks is ice-filled. On the Italian side there is an Italian Alpine Club Refuge at 12,763 feet, only 2,000 feet below the top. By this harder side I had wished to descend; but, as on the Weisshorn, conditions now made this "traverse" impossible.

WHAT I TOOK TO BE THE SUMMIT OF MONT BLANC

It proved to be another 40 minutes to the real summit, and the altitude was beginning to make me go more slowly. My guide stands sure. He never slips, and he has the work of making the steps. Photo by Dora Keen.

From Zermatt the ascent is right up the northeast ridge, the one that is nearest in the familiar view of the mountain. One point is named for a man who lost his life there. Two-thirds of the way up is a break that appears as a white patch at the right in the pictures. This is "the shoulder," and this we reached at 10 a. m., eight hours going and all the worst still ahead (see picture, page 659). Here ropes have been attached to stanchions 40 feet apart, for this slope is usually glare ice on which "crampons," or climbing irons, are useful. But now, for half the three-quarters of an hour across this part, the ropes were out of reach, buried under two feet of snow. It was steep and every step had to be cut; but at least it was not glare ice. This brought us to the worst part of all, the almost perpendicular ascent of an hour and a half, where ropes only help a panting struggle.

"Are you tired?" my leader constantly asked, as I had to gasp for breath a mo-

BEFORE STARTING DOWN THE GLACIER DU DÔME (MONT BLANC) WE STOPPED TO ENJOY THE VIEW OF ITALY, AND TO DISCARD WRAPS

We had already been descending from the summit for three hours. Over the standing guide rises the beautiful and difficult Aiguille de Trélatête, 12,830 feet. Photo by Dora Keen

ON THE FINAL "EASY" GRADE OF THE STEEP SNOW CORNICE (MONT BLANC) WE HAD TO PASS TWO EXHAUSTED GERMANS

It is such guideless climbers as these that get into trouble. They had about two hours more to climb to the fireless Refuge Vallot. From here we went straight down. Photo by Dora Keen.

ment after some 20 or 30 foot sheer climb. It was like going up a wall, pulling with both hands on the fixed rope and feeling about for the occasional footholds. But just a moment's halt to regain my breath was all I ever needed, and at last we gained the final steep and snowy rock-pile, up which there are no ropes. All the way from the shoulder to the top one is exposed to the bitter north wind. The summit was now a cornice of snow, an overhanging shelf, up and down and along which we had to walk for 20 minutes to reach the highest point. The wind came in freezing gusts.

Twice the guides reached quickly toward me, fearful that I would be blown off my feet, as I took my hand off my ice-pick to use my camera. So cold was it and so windy on top that after all our exertion we could not stop to eat, and there was no other place to stop until we were past the shoulder again. The difficulties of changing films, adjusting a color screen, and of photography in general may be imagined.

After ten minutes we could stand it no longer. It was late, too, and the leader asked me to take no more pictures that day. To go down the rocks to the ropes was appalling at times, so steep and slippery were they. It was here that the fatal accident occurred on the first ascent. But, once at the ropes, we could take occasional short slides down them, cautiously, lest we miss the footholds at the end of each bit. Down, down, down we went for eight hours. At 7.30 it grew quite dark, but we feared the deceptive shadows should we light the lantern. By 8 o'clock we were off the rocks, and at 9.30 back at the hotel, my clothes torn to shreds, but not really tired except a

The author and her two guides preparing to leave the Rifugio Torino, 10,900 feet, below the Col du Géant, for the Dent du Géant (see page 671).

The goggles and mask are to protect eyes, face, and lips from snow blindness and blistering when on snow on which the sun is shining. The woolen cap will pull down like a helmet. Mittens are of the heaviest wool. Boots are rawhide, with half-inch soles and nails. Puttees, or cloth bands, are wound around from ankle to knee to give warmth, and to keep snow and stones from getting into the boots, causing blistered feet. All clothing is of warm, light wool, including two very thick pairs of stockings. The rope is 100 feet long, to give 50 feet of leeway between each two persons for difficult climbing. The tourist is always in the center. The head guide is about to tie his end around his waist also.

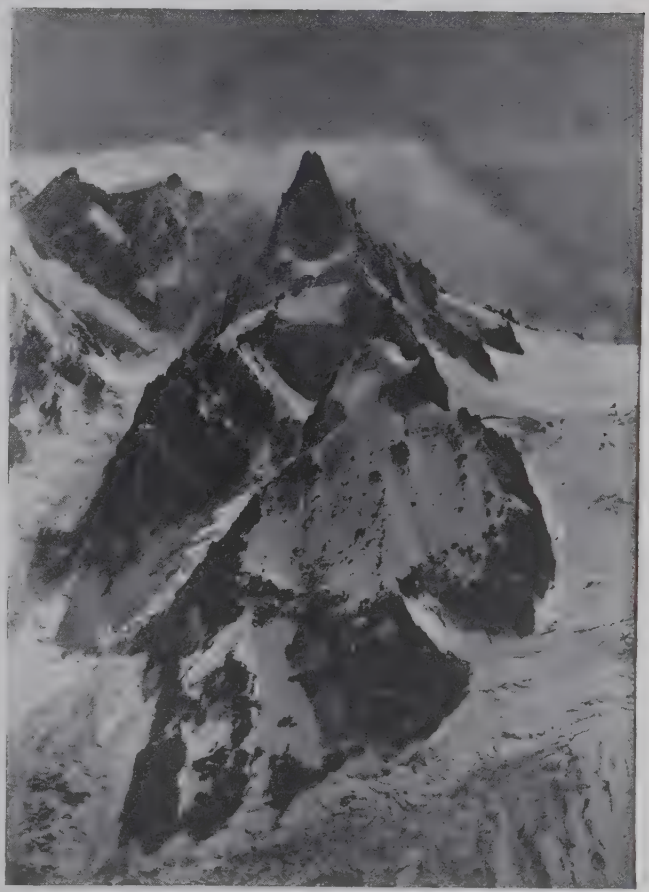
THE DENT DU GÉANT FROM BELOW: OUR ASCENT WAS BY THE RIGHT RIDGE (SEE PAGE 671)

The left can be climbed only where, as here, it is free from snow. What I remember chiefly is a sense of awful struggle; of straining; of pulling myself up by my arms; of feeling about with my feet, feebly, desperately, vainly, for points on which to get even a toehold. But the sense of exhilaration at the top is proportionate. Photo by Wehrli, Kilchberg-Zurich.

little in the knees, from the long descent, and at 6 the next morning we were off for Zermatt, I to pack up and leave that day.

CHAMONIX

I had thought the Zermatt climbs difficult and exhilarating. Exercise I had certainly had. Harder peaks, steeper and far worse snow, and even worse weather were to give me much more thrilling experiences the next season at Chamonix, France. I wanted to climb the famous "Aiguilles," or rock needles, of the chain of Mont Blanc, but my arrival on the 20th of July, 1910, found the winter's snow still deeper and further down on the mountains than it had been at Zermatt. Few climbers had ventured to come, and some had gone away in dismay at the conditions. Instead of improving, they grew continually worse, for there were even fewer clear days than there had been at Zermatt.



THE DENT DU GÉANT FROM ACROSS THE GLACIER DU GÉANT, 4,000 FEET BELOW ITS SUMMIT

This is from the shoulder of the Requin opposite. Photo by Dora Keen

In three and a half weeks I was able to make only seven ascents and only four first-class ones—Mt. Blanc, the Dent du Géant, the Aiguille des Grands Charmoz, and the Dent du Requin. To these four must I confine myself. Throughout my stay, the two hardest ascents at Chamonix, those of the Aiguille du Petit Dru and the Aiguille de Grépon, continued to be quite out of the question.

Warned by the previous year's frequent storms, on the day after my arrival I started at once for a climb high enough to make me a little stiff, as it did, being the first one, but neither very high nor very hard. We had chosen La Glière (9,353 feet, 5½ hours), one of the Aiguilles Rouges, on the other side of the valley from Mont Blanc, for this first practice climb. Usually bare of snow at this season, this year it afforded practice on snow and rocks alike.

CLIMBING THE GIANT'S TOOTH (SEE PAGE 671)

Seated on the higher point of the Dent du Géant, which was like the point to the left, I snapped this view of another caravane of four people climbing up the lower peak in order to climb down the 500-foot tower on its other side. It was snowing and blowing, and the Mount Mandit across is three miles away. An English girl is climbing, while her brother and the porter above and the guide below hold on. The porter is taking up the slack in the rope lest she slip. Her mother in Courmayeur can watch all but this part of her ascent by telescope. Photo by Dora Keen.

### THE AIGUILLE DE L'M, 9,302 FEET, AND THE AIGUILLE DES PETITS CHARMOZ, 9,409 FEET, 9 HOURS

Next came what is termed "a nice little climb," the comparatively difficult and interesting but short rock climbs of the Aiguille de l'M (see picture, page 662) and the adjoining Aiguille des Petits Charmoz.

### MT. BLANC, 15,782 FEET, 19½ HOURS

While not of "first class," these two days' climbs had each meant an ascent of 6,000 feet above the Valley of Chamonix, and all the muscles had been exercised. A day of rain had intervened between them, and fearing that the weather would again break, my guides started me off the very next day, my fifth at Chamonix, on a hard six-day tour which was to include Mt. Blanc (see picture, page 652) and two of the hardest of the Aiguilles.

The ascent of Mt. Blanc from Chamonix is not difficult. There are no rocks. Because of the cold and stormy weather the Glacier des Bossons, in the middle of which is the half-way cabin, was in such good condition that the crevasses had hardly had a chance to open and were still filled with snow. The only very steep parts of the ascent are near the top, on the second day. The first day's ascent lasted only seven hours. When we rose again at midnight, wind, clouds, and the promise of snow made it improbable that we would be able to reach the top, so we stayed comfortably at the Grands Mulets cabin until the next day. Two caravanes that tried for the top got only as far as the last hut, two hours below the top, and back again, for it blew and snowed the whole day; but we were not coming back, and would have had to stay miserably in a cold hut.

The only real danger on Mt. Blanc is from sudden storms, for the whole of the second day's route, up to the top and down again to Chamonix, is on snow, and the beaten tracks quickly become obliterated. If one strays far in the wrong direction, he will get among impassable crevasses, or will come too near to the slopes at the side and may be overwhelmed by avalanches of snow and ice from them; or he may perish from cold.

The ascent from the Grands Mulets to the Refuge Vallot above takes four or five hours, in good weather, and to the tiny summit observatory is another two hours. The Refuge Vallot has mattresses and blankets, but no wood and no food, and its altitude is 14,312 feet. With the best of conditions, the ascent is, therefore, a long pull, and for the last few hours very cold, because all snow and so high.

Hence it is never safe to start for the top without extra warm wraps, special protection for the feet, and a two days' supply of food. Because of the number of people that have been lost, one short section of the route has now been staked, yet shortly after my ascent two caravanes nearly perished far above this point, both from bad judgment. Many people go as far as the Grands Mulets, but one-third of those that start thence for the top turn back at the Grand Plateau, 12,900 feet, when two-thirds of the way up, for there it is that the freezing, the mountain sickness, heart failure, violent headache, or difficult breathing begins.

Starting from the Grands Mulets at 2.45 a. m., we went as fast as was possible over the fresh snow, up and up amid fairy-like scenes first of full moonlight, then of dawn, and finally of sunrise on the massive stretches and slopes and summits of snow on every side. In seven hours we had reached the top, inclusive of about an hour and a half of stops, to eat, to make adjustments, and to photograph. From the Grand Plateau on, it had been intensely cold. I had a violent headache, and the wind was piercing.

Above 15,000 feet I began to breathe less easily and could not continue to go quite so fast. The day was superb, and we were the only caravane. But we could linger only a half hour at the top, for we were to make the long and for a time difficult descent by the Italian side. A snow-covered ice cornice of great

THE SUMMIT OF THE GRANDS CHARMOZ FROM THE GRÉPON (SEE PAGE 671)

These rocks were a mass of snow when we ascended. We went up to the left, around the corner. The chimney is immediately below the summit, but on the other side. Photo by A. G. Wehrli.

steepness took what seemed an interminable half hour to descend. Even step-cutting and crampons did not seem to make it safe from slipping. From it we had to descend the very steep Glacier du Dôme, which was a mass of crevasses at every turn. To descend it thus in the afternoon of a hot day meant plunging to the knees for two hours in soft snow and going in to the hips below every crevasse over which I jumped.

The tiny hut at the foot was already filled by an ascending caravane, so five hours of interminable walking down the Glacier de Miage and over rough ground on a valley path must be added to our day's work. At 10 p. m., 19½ hours after our start, we came into Courmayeur, Italy, 11,800 feet below the summit but not especially tired and with no worse complaint than toes a little sore from the long descent with wet feet. I was the first woman who had reached the top that season and ours the first caravane that had "traversed" Mt. Blanc that year.

### THE GIANT'S TOOTH—DENT DU GÉANT—13,170 FEET, 7½ HOURS

By 4.30 the next morning I was awake again, rested and ready to start later in the day for the formidable Dent du Géant, or Giant's Tooth. From Courmayeur to the Col du Géant, the snow-pass from which the ascent was to be made, was a five-hour climb, first up a steep path, then over easy snow slopes and snowy rocks. We intended to spend two nights at the Col: that is, after ascending the Dent du Géant, to return to the Italian Alpine Club's Refuge below the Col, in order to climb the Requin en route to Chamonix the next day. The ascent of the Géant was thus to be a short one. Only an hour of level snow was to be crossed, so this time there was no need for an early start.

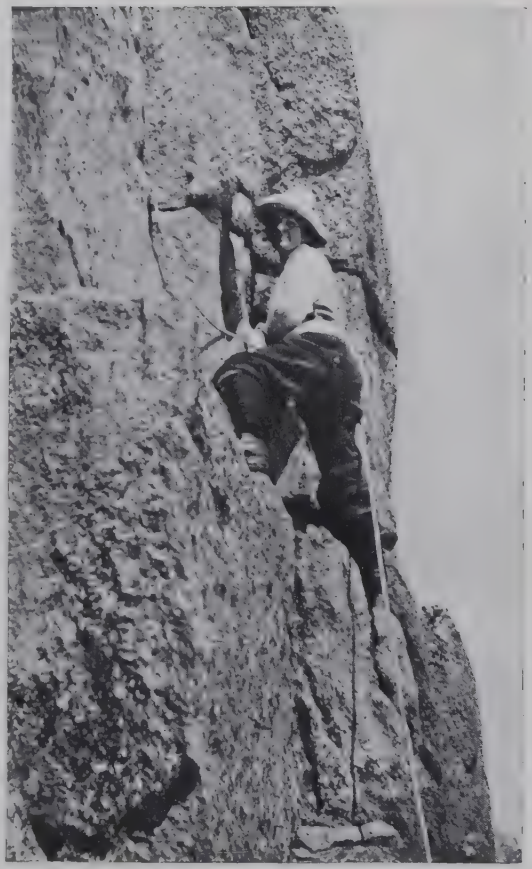
After the snow stretch that lay between the Col and the base of the "tooth" there came three-quarters of an hour of steep, snowy rocks and then nearly two hours of the most exhausting work that I have ever done. The tooth, or rock tower, rises almost perpendicularly 500 feet in the air (see pictures, pages 666, 667, and 668). A few fixed cables there are, but they are poor substitutes for a firm grip on rock. They hang loosely and were sometimes above my reach.

Harder than the Matterhorn was this Aiguille, while it lasted. To find a handhold or foothold, to step or kneel as high as one could, to reach as far and pull as hard as one could, in order to lift one's self up—this was what it meant, and withal hurried, when already gasping, or cut in two by the rope of a well-meaning but overzealous guide above. Once on top, he explained that the snowstorm in which we were now climbing might turn into an electrical storm, and two guides had once been struck by lightning on this Aiguille. But once down, the strain and the anxiety over, I was not tired, for there had been only five hours of great effort or care, and altogether we had been out only 7¼ hours.

The Dent du Requin is not as high as the Dent du Géant, but its ascent is longer, because it is further from any base, and its "needle" is an even sharper point, with no ropes to pull on. After we had waited 24 hours at the Col for the snow to cease, clearly the Requin could not be done, so down to Chamonix we went—down the full length of the beautiful Mer de Glace, for its upper part, above the Géant, is beautiful, very different from its dirty tongue at the Montanvert.

### AIGUILLE DES GRANDS CHARMOZ, 11,293 FEET, 13½ HOURS

Twenty-four hours of sunshine started us up again the next day for the hard Aiguille des Grands Charmoz (see picture, page 670); but it was with clouds and uncertain weather that we set out the day following, and conditions proved to be very bad, indeed. The route to the base was the same as for the Petits Charmoz before. Instead of the short snow couloir to the latter, we had now, however, to ascend the worst glacier I have ever been on. The Glacier des



CLIMBING UP THE TOP OF THE DENT DU REQUIN

The author, starting up the "chimney," or crack, down which the rope comes. It was held taut by the leader, well braced at the top of the chimney, 40 feet above, so that when my foot slipped half way I was in no danger and at once recovered my footing (see page 674). Photo by author's second guide.

FIFTY FEET MORE TO THE TOP OF THE REQUIN

Above the chimney. With good handholds, solid footing for the right foot, and the left knee as high as I can reach, it is only hard work to pull myself up the rocks. Much worse had it been to cross the soft, steep snowdrift below, with fear that it might avalanche, and no holds whatever on the rock at its side. Photo by author's second guide.

Nantillons must be mounted and descended, part of the way right in the track of possible avalanches from its rotten cliffs.

Being only five feet tall, the chief difficulty I have in mountain climbing is in being so much shorter than my guides that I fail to reach. Steep snow, on which I must keep exactly in their steps, for safety and speed, is therefore much harder for me than rocks. Instead of letting me follow my normal pace, laboring as I always had to on snow in order to stride in the steps of my tall leader, he had no mercy, but fairly dragged me along by the rope. He had no choice. It would not do to go under and across where we were going except at a most rapid pace.

Nor was this the worst. Above the glacier, on one side rise the very steep snow slopes of the twin Aiguille des Grands Charmoz and the Aiguille de Grépon, on the other the Aiguille de Blaitière, and the snow on their steep slopes lay not only deep, but soft, and hence ready to slide. To gain the crotch between the Chermoz and the Grépon, from which both are ascended, required an hour's ascent of a couloir of snow which was soft enough and steep enough to put us in constant dread of our weight starting a whole mass down. Every step had to be kicked in as far as the foot would go, and far above the last one, so as not to have any step undermined by the one below. It was as steep as a ladder and just like one. The steps above were the only handholds, and the pick must be plunged to its hilt and far to one side at every step in order to be out of the line of pressure in case of need to hold to it.

At the top came rocks, already steep and difficult enough, and now made slippery by deep snowdrifts, and finally a summit chimney, up which I could not reach a single hold and had to be pulled for some 20 feet. The descent was even worse, for before we could get down, midway on the snow couloir, a fierce sun came full on it, increasing its softness and our concern lest it avalanche. Never more than ten minutes did we stop the whole day, and as I used those minutes to photograph, I had had no more than a bite to eat for 12 hours, when at last, at 2 p. m., we reached the end of the snow.

One of the many crevasses on the steep Glacier du Plan, which we could not easily cross and with difficulty got around (see page 674). Photo by Dora Keen.

COL DES GRANDES MONTETS, 10,634 FEET, 11 HOURS

More rain and snow alternated with briefest sunshine. One unsuccessful attempt of eight hours was made on the Requin, and finally, while waiting for the snow on it to melt, we set out for a very fine snow pass, the Col des Grands

Montets. Although high, this ascent involved no rocks. It was therefore possible even now, and its location under the Aiguille Verte and the Aiguille du Dru afforded wonderful views of both, as well as a superb view of "The Aiguilles," with Mt. Blanc for a background.

### DENT DU REQUIN, 11,214 FEET, 17½ HOURS

The ascent of the Aiguille, or Dent du Requin, "The Shark's Tooth," ranks as the third hardest at Chamonix. The approach was long—three hours up the Mer de Glace, two hours up the steep Glacier du Plan, and finally, two hours along the face of snowy and precipitous rocks. On the Glacier du Plan it had been hard to find a way among the deep crevasses (see picture, page 673), which were on every side and were filled or covered with treacherous snow. Occasionally one of us would sink in to the waist. But the rocks were far worse. Generally bare, we must now take two hours to reach the "shoulder," instead of the usual 40 minutes, for every step across the snow had to be pounded before venturing to tread on it. Even then every fifth step would give way from under our very feet. Only one person could move at a time, and we had to be careful every moment in order not to go down in the small avalanches that we started.

It was 10.45 under a hot sun, seven hours since the start, when we began the acrobatic and difficult ascent to the summit. We saw it close by, and not much higher up; yet it took two hours to reach it in safety, and an hour and a half to get back from the top to the shoulder. Moreover we "traversed" it, and to come down the steeper side involved a chimney, or crack, 115 feet deep. A heavy rope carried along all day—and on the previous six-day tour—for just this purpose was doubled over a projecting rock at the top, and each person in turn slid down it to a ledge half way. Since to carry a rope longer than 115 feet would be too heavy, and loose it must be, in order to be pulled down again, an iron staple had here been driven into the rock. On the slanting, slippery, small shelf opposite it three must find lodgment while the rope was pulled down and doubled over the staple for the other half of the descent.

It was thus 2.45 p. m. by the time we started down from the shoulder. For two hours we had been hearing avalanches on every side every few minutes, and this was our real anxiety. Just as carefully as we had come up must we go down the precipitous base rocks, for now the snow was softer, therefore more ready to loosen itself from the rocks and slide. This was, in fact, what actually happened.

Three times did I see the guide below me, to whom I was roped, sliding down, 10, 15, or 20 feet, carried down by snow that had been too soft to bear his weight. But each time he wheeled as he slid slowly down, dug his ice-pick into the snow far above his head, stopped himself, and climbed up without once dragging me down. A truly thrilling day had it been, and 17½ hours long by the time we got back to the Montanvert.

### CONTRASTS

In summarizing and contrasting these 16 climbs, I should rank the Matterhorn as the hardest, because it was so long under the conditions that we had, and was hard all the time, but the Chamonix guides do not admit that it is harder than the Aiguilles. In general, except for the Matterhorn, the ascents at Chamonix were harder, more interesting, and more of an anxious strain than those at Zermatt. If one wishes to convince himself of this he has only to consult the tariff for guides for these different ascents as given in Bædeker. The worst ones at Chamonix are more expensive than the worst at Zermatt; because harder and involving more risk, and the very worst at Chamonix have no tariff. Even Mt. Blanc, as we did it, was a 19½-hour day, the coldest, too, and some hours of it were anxious because of the descent by the Italian side. Monte Rosa and the Weisshorn were also hard. But

the hardest exertion of all was probably on the short Dent du Géant, the most continuous anxiety on the Grands Charmoz, and the most thrilling and most interesting experiences on the Dent du Requin. As for views, too, perhaps the Requin was the finest, although they were quite different in character and perhaps not more beautiful than those on Monte Rosa and Mt. Blanc. Clouds veiled the views on the Weisshorn and the Grands Chermoz, but views through mist and peeps through flitting clouds have the added charm of mystery and constant variety.

How one climbs, why one feels that it is safe to go on such ascents, what one's sensations actually are, and, above all, what there is to offset such strain and anxiety have hardly been suggested. In so summary a review of merely the chief difficulties of 16 climbs, I cannot hope to have given any of the feeling of the wonders of the High Alps. For even an idea of what it is really like I must trust to the illustrations, and for the rest can only hope that I have aroused enough interest to stimulate the reader's own imagination or to make him wish to find out for himself the rewards of mountain climbing.

# OUR FRIENDS, THE BEES

## By A. I. Root and E. R. Root

*Growing bees for pleasure or profit is one of those American industries whose magnitude is entirely unsuspected by the average citizen. According to a recent report there are approximately 800,000 persons keeping bees in the United States, and the annual output of honey and beeswax is estimated as worth $22,000,000. One reason that bee-keeping is so popular in this country is that American ingenuity has invented many devices which simplify the work and enable the owner at all times readily to ascertain the health of his bee colony (see pictures, pages 680-683). The following article and photographs are from "The A B C and X Y Z of Bee Culture," by A. I. Root and E. R. Root. The Root family, of Medina, Ohio, are practical apiarists, who have been studying and keeping bees for 40 years and who have originated many of the methods and apparatus that are used by thousands of bee-lovers in all parts of the world. Their book, which may be justly called "a cyclopedia of everything pertaining to the care of the honey-bee," contains the results of their long experience and of the observations of tens of thousands of correspondents. It is one of the most fascinating volumes published in a long time. The illustrations, of which there are several hundred, are particularly good.*

WE CONFESS we do not like the term "anger," when applied to bees, and it almost makes us angry when we hear people speak of their being "mad," as if they were always in a towering rage and delight to inflict severe pain on everything and everybody coming near them. Bees are, on the contrary, the pleasantest, most sociable, genial, and good-natured little fellows one meets in all animated creation, when one understands them.

Why, we can tear their beautiful comb all to bits right before their very eyes; and without a particle of resentment, but with all the patience in the world, they will at once set to work to repair it, and that, too, without a word of remonstrance. If you pinch them they will sting; and anybody who has energy enough to take care of himself would do as much had he the weapon.

We as yet know comparatively very little of bees, and the more we learn

A DISSECTED BEE-TREE, SHOWING THE MANNER IN WHICH THE BEES ARRANGE THE HONEY-COMB IN THE HOLLOW TRUNK

Fortunately, in this case the swarm was accommodating enough to make the nest close to the ground, where it could be easily captured. Photo from "A B C and X Y Z of Bee Culture," by A. I. and E. R. Root.

the easier we find it to be to get along without any clashing in regard to who shall be master. In fact, we take all their honey now, almost as fast as they gather it; and even if we are so thoughtless as to starve them to death, no word of complaint is made.

There are a few circumstances under which bees seem "cross," and, although we may not be able to account exactly for it, we can take precautions to avoid these unpleasant features by a little care. A few years ago a very intelligent friend procured some Italians, an extractor, etc., and commenced bee culture. He soon learned to handle them and succeeded finely. When it came time to extract, the whole business went on so easily that he was surprised at what had been said about experienced hands being needed to do the work.

He had been in the habit of doing this work as directed, toward the middle of the day, while the great mass of the bees were in the fields; but in the midst of a heavy yield of clover honey, when the hives were full to overflowing, they were one day stopped by a heavy thunder shower. This, of course, drove the bees home, and at the same time washed the honey out of the blossoms so completely that they had nothing to do but remain in the hives until more was secreted.

Not so with their energetic and enthusiastic owner. As soon as the rain had ceased, the hives were again opened and an attempt made to take out the frames, as but a few hours before; but the bees that were all gentleness then seemed now possessed of the very spirit of mischief and malice; and when all hands had been severely stung, they concluded that prudence was the better part of valor and stopped operations for the day.

While loads of honey were coming in all the while and every bee rejoicing, none were disposed to be cross; but after the shower all hands were standing around idle, and when a hive was opened each was ready to take a grab from its neighbor, and the result was a free fight in a very short time.

There is nothing in the world that will induce bees to sting with such wicked recklessness as to have them get to quarreling over combs or honey left exposed when they have nothing to do. From a little carelessness in this respect, and nothing else, whole apiaries have been so demoralized that people were stung when passing along the street several rods distant. During the middle of the day, when bees were busily engaged on the flowers during a good yield, we have frequently left filled combs standing on the top of a hive from noon until supper time without a bee touching them; but to do this after a hard rain, or at a time when little or no honey is to be gathered in the fields, might result in the ruin of several colonies and you and your bees being voted a nuisance by the whole neighborhood.

### DEMONSTRATING BEES AT FAIRS

The operator begins his performance by stepping inside the cage of live bees and shutting the door behind him. He then tells the crowd that he is going to handle live bees, every one of which is armed with a sting, and, if any one doubts it, to come forward and he will furnish the "proof." He then proceeds to take off his coat and vest and roll up his sleeves, take off his collar, and tuck down his shirt-band.

It will then be necessary for him to put on bicycle pants-guards, or slip his trousers into his stockings. The crowd will quickly appreciate this part of the performance, because the operator tells them the bees will sting if they get inside of his clothing.

With a lighted smoker he opens up the hive. After pulling out the frames he shows the bees and queen on the comb. Then he calls out for everybody to wait and see the next stunt, for he is going to make a swarm. With a large dishpan, which he has previously provided, he shakes two-thirds of the bees off the combs into this pan. Then he takes it up and turns to the crowd, saying: "The bees are not real mad yet, so I'll begin to shake them up to make them

Photo from "A B C and X Y Z of Bee Culture," by A. I. and E. R. Root

A PART OF A FIELD OF DANDELIONS IN FULL BLOOM AT MEDINA, OHIO

so." The people wonder what he is going to do, seeing him barearmed and bareheaded.

He keeps on shaking until he has the bees all in one big ball, and to the uninitiated it *looks* as if they would sting him to death. But no; the continual shaking is the *very thing* that makes them gentle instead of cross.

He now runs his hand under the ball of bees, pushing it under gently, being careful not to pinch any. The movement must be very deliberate—so slow, indeed, that the hand scarcely seems to

move. He picks up a handful and holds them up for the crowd to look at. If he has good nerves he can shake the handful on top of his head and in the meantime pick up another handful.

YOUNG BEES AT WORK

The first day after the young bee gnaws its way out of the cell it does little but crawl around; but about the next day it will be found dipping greedily into the cells of unsealed honey, and so on for a week or more. After about the first day it will also begin to look after the wants of the unsealed larvæ, and very soon assists in furnishing the milky food for them. While doing so a large amount of pollen is used, and it is supposed that this larval food is pollen and honey, partially digested by these young nurses.

Bees of this age, or a little older, supply royal jelly for the queen-cells, which is the same, probably, as the food given very small larvæ. Just before they are sealed up, larvæ to produce worker-bees and drones are fed on a coarser, less perfectly digested mixture of honey and pollen.

Young bees have a white, downy look until they are a full week old, and continue a peculiar young aspect until they are quite two weeks old. At about this latter age they are generally active comb-builders of the hive. When a week or ten days old they take their first flight out of doors. We know no prettier sight in the apiary than a host of young Italians taking a playspell in the open air in front of their hive. Their antics and gambols remind one of a lot of young lambs at play.

It is also very interesting to see these little chaps bringing their first load of pollen from the fields. If there are plenty of other bees in the hive of the proper age, they will not usually take up this work until about two weeks old. The first load of pollen is to a young bee just about what the first pair of pants is to a boy-baby.

Instead of going straight into the hive with its load, as the veterans do, a vast amount of circling round the entrance

Photo from "A B C and X Y Z of Bee Culture," by A. I. and E. R. Root

A LIVE BEE HAT

must be done; and even after the young bee has once alighted it takes wing again before rushing all through the hive, to jostle nurses, drones, and perhaps the queen, too, saying as plainly as could words, "Look! Here am I. I gathered this, all myself. Is it not nice?"

We might imagine some old veteran, who had brought thousands of such loads, answering gruffly, "Well, suppose you did; what of it? You had better put it in a cell and start off after more, instead of making all this row and wasting time, when there are so many mouths to feed."

We said we might imagine this, for we have never been able to find any indication of unkindness inside a beehive.

Photos from "A B C and X Y Z of Bee Culture," by A. I. and E. R. Root

LEARNING CONDITION OF HIVE WITHOUT REMOVING COVER OR PULLING TO PIECES

No one scolds or finds fault, and the children are never forced to work. If they are improvident and starvation comes, they all suffer alike, and, we do believe, without a single bit of hard feeling or censure toward any one. They all work together, just as your right hand assists your left, and if we would understand the economy of the beehive, it were well to bear this point in mind.

Shortly following the impulse for pollen-collecting comes that for honey-gathering, and the bee is probably in its prime as a worker when a month old. At this age it can, like a man of 40, "turn its hand" to almost any domestic duties: but if the hive is well supplied with workers of all ages, it now probably does most effective service in the field.

CHARLES MONDENG AND HIS SON NORMAN DEMONSTRATING ADEL BEES AT THE MINNESOTA STATE FAIR

Norman Mondeng is only 11 years old, yet he handles bees without fear. His entire clothing was a bathing suit. Mr. Mondeng and his son were awarded the first prize for bee demonstration—first prize on golden Italian bees and first prize on leather-colored Italian bees. Photo from "A B C and X Y Z of Bee Culture," by A. I. and E. R. Root.

### BEFORE SWARMING, BEES SEND OUT SCOUTS

Where a colony gets excessively strong, the inmates of the hive, by a sort of preconcerted mutual agreement, divide themselves off into two parties, one remaining in the old hive and the other starting out to seek their fortunes elsewhere.

We have carefully watched this proceeding with a view of determining how the matter comes about: that is, whether it is because a part of the bees become dissatisfied with their old home and seek to better their condition, or because the queen leaves, for some reason of her own (because she has not room to lay her eggs, for instance), and the bees simply follow from a sort of natural instinct, since she is the mother of the colony and an absolute necessity to their prosperity. After seeing a number of swarms issue, and finding that the queen was among the last to leave the hive, we concluded that the bees take the lead, and that the queen simply followed as a matter of course in the general melée.

Suppose, however, that the queen should not take a notion to join the new

EDITOR OF "A B C AND X Y Z OF BEE CULTURE" HANDLING BEES: A COMFORTABLE POSITION FOR ALL-DAY WORK

Note that the left arm that supports the weight of the frames rests comfortably on the knee. Photo from "A B C and X Y Z of Bee Culture," by A. I. and E. R. Root

adventure. Swarms do sometimes start out without a queen accompanying them, but they usually go back to the hive, after a time, to try it again next day. If she does not go then, nor at the next attempt, they often wait until they can rear a new queen, and then go off with her. After we were pretty well satisfied that this is the correct idea of their plan, a little circumstance seemed to upset it all.

A neighbor, wanting to make an observatory hive, drummed perhaps a quart of bees from one of his old hives. As he had no queen, we gave him a black one, taken from a colony purchased several miles away. We mention this to show that the queen had never been out of the hive in the location which it then occupied.

After a day or two this neighbor informed us that we had played a fine trick on him, for our queen had gone home and taken his quart of bees with her. We told him it was impossible, for she had never been out of the hive, ex-

Photos from "A b C and X Y Z of Bee Culture," by A. I. and E. R. Root

HOW BEES AND QUEENS ARE PUT UP IN A MAILING CAGE: INSERTING THE CAPTIVE QUEEN IN HER CAGE

BENTON MAILING CAGE, IN WHICH A QUEEN BEE CAN SAFELY TRAVEL FROM THE UNITED STATES TO AUSTRALIA

Photo from "A B C and X Y Z of Bee Culture," by A. I. and E. R. Root

EFFECT OF A STING NEAR THE EYE

cept when we carried her over in the cage.

We went and looked in the hive she came from, and there she was, true enough, with the bees she had brought with her stung to death in front and on the bottom-board. It is possible that the bees swarmed out first; but, even if they did, they certainly followed the queen in going back to her old home. We also know that bees sometimes follow a young queen when she goes out to take her wedding-flight.

It is our opinion that neither queen nor workers alone make the first start, but all hands join together and act in concert.

While it is true that a swarm will issue without any previous preparation when a swarming craze is on in the yard, the great majority of colonies preparing to swarm send out scouts, or prospectors. These bees hunt up cavities in hollow trees, or even seek out empty hives, and commence "cleaning house". The number of scouts having located a home will increase until there appears to be quite a little swarm, and sometimes one is led to believe there is a case of robbing going on, especially if the scouts have entered an empty hive containing combs. They will continue to make their visitations day by day, and in the meantime they busy themselves by cleaning house.

When the day comes for the swarm to issue, the scouts appear to make it their business to lead the flying bees to this new location. Just how they do this cannot be definitely shown; but that they do lead these swarms to particular abodes has been so clearly proven that there is no further question about it. This shows why a swarm will sometimes "light out" without even clustering. Following the lead of their scouts, they will go directly to their new home, which has been already prepared.

As a general rule a swarm clusters first. Whether this is for the purpose of getting the scouting party "organized" and into action no one knows. If the scouts have not already found a location, it is possible that the clustered swarm is sending out some scouts to prospect; and, having found a hollow tree, they will go back to the cluster, when all will "hike" for the new home.

While these may be fanciful suggestions, it may account for the reason why a swarm will sometimes hang on a tree for several days, the inference being that the scouts have failed to locate any suitable home.

BEES DO NOT INJURE SOUND FRUIT

Every now and then we hear complaints of how bees will attack and eat up fruit; and, to a casual observer, at least, they apparently do bite through the skin and extract the juices until the specimen is shriveled up to a mere semblance of its former shape and size. Careful investigation has shown repeatedly that bees never attack sound fruit, no matter how soft the skin nor how juicy and pulpy the contents within the skin.

The authors have had, during the past 30 years, between 300 and 400 colonies

BEES WITH MASSES OF POLLEN ON THEIR LEGS

Note the bee in the lower right-hand corner, with two masses of pollen almost as large as its body. The rear legs of each bee have a "pollen-basket," to which is transferred the pollen which it gathers by means of its tongue and the rough hairs and spines on its fore and middle legs. On entering the hive the bee crosses its pollen-laden legs and then kicks the loads off to the bottom of the cells. Nursing bees then take the pollen and mash it down into a hard cake for food for the brood (see page 679). Photo from "A B C and X Y Z of Bee Culture," by A. I. and E. R. Root.

Photo from "A B C and X Y Z of Bee Culture," by A. I. and E. R. Root

LIMB OF A TREE CUT OFF WITH THE SWARM READY TO HIVE

located in a vineyard at their home apiary. Notwithstanding hundreds and hundreds of pounds of grapes are raised every year, the bunches hanging within three or four feet of the entrance of the hives, the sound fruit is never attacked, but during a dearth of honey, a broken or otherwise bruised bunch of grapes will occasionally be visited by a few bees.

The writer of this article has attended various horticultural and pomological conventions, both State and national. Among the progressive fruit-growers and horticulturists there is a general acknowledgment that bees do not attack sound fruit; that the little damage they do to damaged fruit is compensated for a hundred times over by the indispensable service they perform in pollinating fruit-blossoms early in the season, when no other insects or means of mingling the pollen exists. Indeed, some of our best fruit-growers are now keeping a few hives of bees in each of their orchards. Often they invite bee-keepers to locate yards of bees either in the orchards or as near as it is practicable to put them.

But a casual observer might easily get the impression that bees not only suck damaged fruit dry, but actually puncture and eat up sound fruit. Some years ago a neighbor sent word to us that he would like to have us come up to his vineyard and he would give us undisputable proof that our bees were actually puncturing his grapes and sucking out the fruit.

We looked at the luscious bunches as they were hanging down, and, sure enough, there were small, needle-like holes in almost every berry that the bees were working on. It looked like a clear case of "caught-in-the-act" evidence against them. For the time being we were unable to offer a satisfactory explanation. We brought the matter to the attention of an old farmer who had been a bee-keeper for many years. Finally one morning he sent word to us that he had found the guilty culprit, and that if we would come down to his place *early* some morning he would point him out. This we did.

He showed us a little bird, quick of flight, and almost never to be seen around the vines when any human being

Photos from "A B C and X Y Z of Bee Culture," by A. I. and E. R. Root

A VIEW OF THE APIARY OF A. I. ROOT CO., SHOWING HIVES IN THE FOREGROUND, WITH A GRAPEVINE AT EACH HIVE (SEE PAGE 686)

A SWARM ENTERING A HIVE

Photo from "A B C and X Y Z of Bee Culture," by A. I. and E. R. Root

A FINE, SYMMETRICAL SWARM WITHIN EASY REACH

was present. This bird, about the size of a sparrow, striped, and called the Cape May warbler (*Dendroica tigrina*), has a long, sharp, needle-like beak. It will alight on a bunch, and, about as fast as one can count the grapes, will puncture berry after berry.

After his birdship has done his mischief he leaves, and then come the innocent bees, during the later hours of the day, and finish up the work of destruction by sucking the juices and the pulp of the berry until it becomes a withered skin over a few seeds. While the birds during the early hours of the day are never seen, the bees, coming on later, receive all the credit for the mischief.

The Cape May warbler is not the only bird guilty of puncturing grapes. There are many other species of small birds that learn this habit, and among them we may name the ever-present sparrow and the beautiful Baltimore oriole, the sweet singer that is sometimes called the swinging bird, from its habit of building its nest on some overhanging limb.

BEES AND ANTS

Although we have given the matter considerable attention, we cannot find that ants are guilty of anything that should warrant, here in the North, the apiarist in waging any great warfare against them. Some years ago a visitor frightened us by saying that the ants about our apiary would steal every drop of honey as fast as the bees could gather it. Accordingly we prepared ourselves with a tea-kettle of boiling water, and not only killed the ants, but some grapevines growing near.

Afterward there came a spring when the bees, all but about 11 colonies, dwindled away and died, and the hives filled with honey, scattered about the apiary unprotected, seemed to be as fair a chance for the ants—that had not "dwindled" a particle—as they could well ask for. We watched to see how fast they would carry away the honey; but, to our astonishment, they seemed to care more for the hives that contained bees than

MUD BEEHIVES IN JEZREEL, PALESTINE
Photo by I. W. Metcalf, Oberlin, Ohio; from "A B C and X Y Z of Bee Culture," by A. I. and E. R. Root

DUTCH SWARM SPECIALISTS INSPECTING BARGAINS AT THE BEE-MARKET IN HOLLAND
Contrast with the simplicity of the American hive. Photo from "A B C and X Y Z of Bee Culture," by A. I. and E. R. Root

Photo from "A B C and X Y Z of Bee Culture," by A. I. and E. R. Root

SCHOOLMA'AMS AND SCHOOLMASTERS, AFTER TAKING THEIR FIRST LESSON IN BEE-KEEPING AT THE A. I. ROOT COMPANY'S HOME APIARY, MEDINA, OHIO

for those containing only honey. We soon determined that it was the warmth from the cluster that especially attracted them; and, as the hives were directly on the ground, the ants soon moved into several that contained only a small cluster and for a while both used one common entrance.

As the bees increased they began to show a decided aversion to having two families in the same house, although the ants were evidently inclined to be peaceable enough until the bees tried to "push" matters, when they turned about and showed themselves fully able to hold possession.

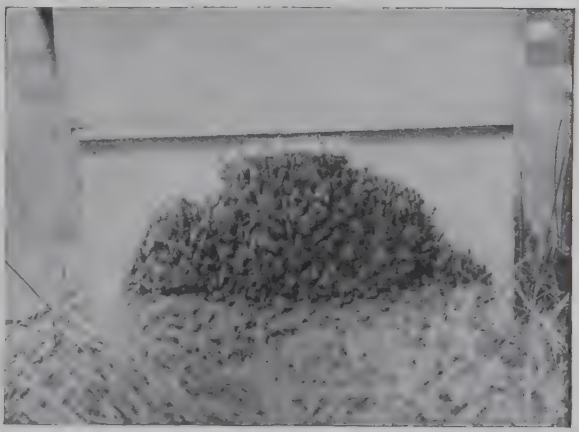


Photo from "A B C and X Y Z of Bee Culture," by A. I. and E. R. Root

A COLONY WITH AN ENTRANCE TOO SMALL, WHERE THE BEES HAVE FORMED THE LOAFING HABIT

The bees seemed to be studying over the matter for a while, and finally we found them one day taking the ants, one by one, and carrying them high up in the air and letting them drop at such a distance from their home that they would surely never be able to walk back again. The bees, as fast as they became strong colonies, drove the ants out; and our experience ever since has been that a *good* colony of bees is never in any danger of being troubled in the least by ants. One weak colony, after battling awhile with a strong nest of the ants, swarmed out; but they might have done this anyway, so we do not lay much blame to the ants.

But ants do prove to be very annoying in those apiaries where there is any attempt to keep the grass down with a lawn-mower. The little hillocks that they make all over the yard disfigure it to some extent, as well as forming more or less obstruction to the scythe and lawn-mower.

### BREEDING BEES FOR IMPROVED VARIETIES

In the breeding of domestic animals it is possible to mate together a choice male and a choice female. Much could be accomplished in the way of improved stock if we could also control the male parentage of bees, and we do not know but that in-breeding, according to modern methods now known in stock-raising, might secure for us a race of bees greatly superior to anything we now know.

Just at present it seems very desirable that bees with longer tongues be bred, so that the nectar in the deep corolla-tubes of red clover, in the horsemint of Texas, and the mountain sages of California, as well as hundreds of other flowers, could be reached. Tons and tons of honey might thus be secured that otherwise goes to waste.

*Bee-keeping is one of the best of the life-saving, nerve-healing avocations. It takes the mind from household cares as completely as would a trip to Europe, for one cannot work with bees and think of anything else. Some of the attributes which make bee-keeping an interesting avocation I will mention. First of all, bees are such wonderful creatures and so far beyond our comprehension that they have for us always the fascination of an unsolved problem. I never pass our hive without mentally asking, "Well, you dear little rascals, what will you do next?"

* This and following paragraphs were written by Mrs. Anna B. Comstock.

KINDERGARTEN METHODS IN BEE-KEEPING

Looking for the queen. "There she is, daddy." Photo from "A B C and X Y Z of Bee Culture," by A. I. and E. R. Root

Photo from "A B C and X Y Z of Bee Culture," by A. I. and E. R. Root

HIVES OF BEES PACKED FOR EXPORT TO ARGENTINA

Bees are of particular interest to woman for several reasons: if she likes good housekeeping, then the bee is a model; if she likes a woman of business, again is the bee a shining light; if she is interested in the care of the young, then is the bee-nurse an example of perfection; if she believes in the political rights of woman, she will find the highest feminine political wisdom in the constitution of the bee commune. In fact, it is only as a wife that the bee is a little too casual to pose as ideal, although as a widow she is certainly remarkable and perhaps even notorious.

As a means of cultivating calmness, patience, and self-control, the bee is a well-recognized factor. Bees can be, and often are, profoundly exasperating; and yet how worse than futile it is to evince that exasperation by word or movement! No creature reacts more quickly against irritation than the bee. She cannot be kicked nor spanked; and if we smoke her too much we ourselves are the losers. There is only one way to manage exasperation with bees—that is, to control it—and this makes the apiary a means of grace.

The money-making side of bee-keeping is a very important phase in arousing and continuing the woman's interest in her work. I think woman is by birth and training a natural gambler, and the uncertainties of the nectar supply and of the honey market add to rather than de-

tract from her interest in her apiary. I know of several women who have made comfortable incomes and supported their families by bee-keeping; but, as yet, I think such instances are few. However, I believe there are a large number of women who have added a goodly sum yearly to their amount of spending money, and have found the work a joy instead of a drudgery.

Personally I have had very little experience with the commercial side of bee-keeping. Once, when our maddeningly successful apiary grew to 40 hives when we did not want more than a dozen at most, and the neighborhood was surfeited with our bounty, we were "just naturally" obliged to sell honey. We enjoyed greatly getting the product ready for market, and were somehow surprised that so much fun could be turned into ready cash.

As a matter of fact, both my husband and myself have absorbing vocations and avocations in plenty, so that our sole reason for keeping bees is because we love the little creatures, and find them so interesting that we would not feel that home was really home without them. The sight of our busy little co-workers adds daily to our psychic income.

We are so very busy that we have very little time to spend with them, and have finally formulated our ideal for our own bee-keeping, and that is to keep bees for honey and for "fun". We shall have plenty of honey for our own table, and just enough to bestow on the neighbors so they will not get tired of it; and fun enough to season life with an out-of-door interest and the feeling that no summer day is likely to pass without a surprise.

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## REVIEW OF GOOD BOOKS

"Roman Cities in Italy and Dalmatia." By A. L. Frothingham, Ph. D. Pp. 343; 8½ x 6 inches. 100 illustrations and map. New York: Sturgis & Walton.

Professor Frothingham, who holds the chair of Ancient History and Archæology at Princeton University, has produced in this a most valuable work. The picture of Ancient Italy and pre-Augustan Rome, drawn from her rivals, is of absorbing interest, and the author presents his observations in what might be termed popular form.

After a trip through Italy and Dalmatia, where the evolution of these centuries can be studied without foreign admixture, this book brings us back to Rome with a far more complete idea of its ancient art and culture.

"Lassoing Wild Animals in Africa." By Guy H. Scull. Pp. 135; 5½ x 8 inches. 32 photographic illustrations. New York: The Frederick A. Stokes Co. Price, $1.25 net.

We have had a number of valuable books on big game hunting in Africa with guns, but the account of this expedition into the heart of the big game country to lasso the lion, rhinoceros, cheetah, giraffe, hartebeest, etc., and making photographs of the operation is truly remarkable and of absorbing interest. Colonel Roosevelt has written an introduction, in which he says in part: "No hunting trip which took place in Africa was more worthy of commemoration, and the feats of roping these animals showed a cool gallantry and prowess which would rejoice the hearts of all men." The photographs of the actual operation, taken by the well-known English bird photographer, Kearton, are splendid.

"A Guide to Great Cities—Western Europe." By Esther Singleton. Pp. 350. 12 illustrations. New York: The Baker & Taylor Company. Price, $3.00 net.

This book, for the younger generation of travelers and readers, describes the great cities of France and Spain and Portugal. The value of holding the interest of youth has been well considered, and the volume will most certainly stimulate a geographical interest in the youthful breast.

"The Toll of the Arctic Seas." By Deltus M. Edwards. Pp. 440. 6¼ x 8½ inches. Illustrations with half-tones and 4 maps, including a map of the Arctic regions by Gilbert H. Grosvenor. New York: Henry Holt & Co. Price, $2.50 net.

This is an account of the principal exploring expeditions to the far north, commencing with Barents in 1594, and ending with Peary's conquest of the North Pole in 1909. The work of seventeen explorers is thus summarized.

It is a most useful book, for between its covers are told the main features of the exploration of the north and the search for the Pole. It is rather surprising to find such a work, which, of course, can hit only the high places—a series of very readable stories.

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THE NATIONAL GEOGRAPHIC MAGAZINE

# NOTES ON THE SEA DYAKS OF BORNEO*

BY EDWIN H. GOMES

THE Bornean jungles are immense tracts of country covered by gigantic trees, in the midst of which are mountains clothed in evergreen foliage, their barren cliffs buried beneath a network of creepers and ferns. The striking features are the size of the enormous forest trees and the closeness of their growth, rather than their loveliness or brilliancy of color. In the tropical forests few bright-colored flowers relieve the monotony of dark green leaves and dark brown trunks and branches of trees. The prevailing hue of tropical plants is a somber green. The greater and lesser trees are often loaded with trailers and ferns, among which huge masses of the elkhorn fern are often conspicuous.

But there is little color to relieve the monotony of all these somber hues. Here and there may be seen some creeper with red berries, and many bright-colored orchids hang high overhead. But it is impossible for the observer to gain a favorable position for beholding the richest blooms, which often climb far above him, turning their faces towards the sunlight above the roof of foliage.

These regions are still inhabited by half-clad men and women, living quaint lives in their strange houses, observing weird ceremonies, and cherishing strange superstitions and curious customs, delighting in games and feasts, and repeating ancient legends of their gods and heroes. But in a few years all these things will be forgotten; for in Borneo, as elsewhere, civilization is coming—coming quickly—and all the distinctive Dyak customs will soon be things of the past. Already the Dyak is mixing with other races in the towns, and is changing his picturesque dress for Western costume. He is fast forgetting his old practices and his old modes of thought.

The tropical forests of Sarawak were much the same years ago as they are today. But the life of the Dyak is already greatly changed and his lot improved by the introduction of just rule, law and order, and respect for human life. For a moment let us go back to the past and try to picture the life of the Sea Dyak as it was some 60 years ago.

In those days there was constant warfare between the different tribes, and the Dyaks lived together in large numbers in their long houses, which had stockades around them, so that they had some defense against any sudden attack. Very often the young braves would make an expedition against some neighboring tribe, simply because they wanted to

* Abstracted from Mr. Gomes' exceedingly entertaining narrative, "Seventeen Years Among the Sea Dyaks of Borneo," published by J. B. Lippincott Co.

A DYAK GIRL DRESSED IN ALL HER FINERY TO ATTEND A FEAST

She has in her hair a comb decorated with silver filigree work. Round her neck is a necklace of beads. The rings round her body are made of hoops of cane, round which little brass rings are arranged close together, so that none of the cane is visible. These hoops are worn next to the body, above the waist and over the petticoat below. The silver coins fastened to this brass corset, and worn as belts around it, are the silver coins of the country. The petticoat is a broad strip of cloth, sewn together at the ends and having an opening at the top and bottom. It is fastened at the waist with a piece of string. From "Seventeen Years Among the Sea Dyaks of Borneo," by Edwin H. Gomes. J. B. Lippincott Co.

A DYAK WOMAN IN EVERY-DAY COSTUME

She is wearing a necklace of small silver current coins, fastened together with silver links. The bangles are hollow and of silver or brass, made separately, but worn several together on each wrist. The two favorite colors for petticoats are blue and red. The red petticoat, as in the picture, has often a design in white worked or woven into it. From "Seventeen Years Among the Sea Dyaks of Borneo," by Edwin H. Gomes. J. B. Lippincott Co.

A DYAK BRIDE

She wears a silver filigree comb in her hair and a necklace of brass or silver buttons. Round her body is the brass corset worn by the women, and three belts of silver coins. She has bangles on her wrists and earrings in her ears. Her jacket is slung over her right shoulder. From "Seventeen Years Among the Sea Dyaks of Borneo," by Edwin H. Gomes. J. B. Lippincott Co.

SCRAPING PALM LEAVES FOR FIBER

With this the women tie up the threads they weave, so that when they are dipped in any particular dye the parts which are tied may not be affected by the dye. It is by this means that the different patterns in Dyak cloth are obtained. From "Seventeen Years Among the Sea Dyaks of Borneo," by Edwin H. Gomes. J. B. Lippincott Co.

bring home, each man of them, the ghastly trophy of a human head, and thus gain favor in the eyes of the Dyak girls. In these expeditions many were killed and many taken captive, to be the slaves of the conquerors.

Many of the Sea Dyaks joined the Malays in their piratical attacks upon trading boats. It was the practice of the Malay pirates and their Dyak allies to wreck and destroy every vessel that came near their shores, to murder most of the crew who offered any resistance, and to make slaves of the rest. The Malay fleet consisted of a large number of long war-boats, or *prahus,* each about 90 or more feet long, and carrying a brass gun in the bows, the pirates being armed with swords and spears and muskets. Each boat was paddled by from 60 to 80 men. These terrible craft skulked about in the sheltered coves waiting for their prey, and attacked merchant vessels making the passage between China and Singapore. These piratical raids were often made with the secret sanction of the native rulers, who obtained a share of the spoil as the price of their connivance.

The Dyaks gladly joined the Malays in these expeditions, not only for the sake of obtaining booty, but because they could thus indulge in their favorite pursuit, and gain glory for themselves by bringing home human heads to decorate their houses with. The Dyak *bangkongs* were long boats capable of holding as many as 80 men. They often had a flat roof, from which the warriors fought, while their comrades paddled below.

Both the piracy and the terrible custom of head-hunting were put down by Sir James Brooke. The romantic story of how he came to be the first Rajah of Sarawak may here be briefly recalled.

James Brooke was born on April 29, 1803. His father was a member of the civil service of the East India Company, and spent a great many years in India. Following in his father's footsteps, he entered the company's service, and was sent out to India in 1825. Not long after his arrival he was put in command of a regiment of soldiers and ordered to Burmah, where he took part in the Burmese War; and, being dangerously wounded in an engagement, was compelled to return home on furlough. For over four years his health prevented him from rejoining his regiment, and when at last he started, the voyage out was so protracted, through a shipwreck and other misfortunes, that his furlough had expired before he was able to reach his destination. His appointment consequently lapsed, and he quitted the service in 1830.

In that same year he made a voyage to China, and was struck by the natural beauty and fertility of the islands of the Indian Archipelago and horrified with the savagery of the tribes inhabiting them, who were continually at war with one another and engaged in a monstrous system of piracy. He conceived the grand idea of rescuing them from barbarism, and of extirpating piracy in the Eastern Archipelago.

On the death of his father he inherited the sum of £30,000, and found himself in a position to carry out his schemes. He bought and equipped a yacht, the *Royalist,* and for three years he cruised about, chiefly in the Mediterranean, training his crew of 20 men for the arduous work that lay before them.

On October 27, 1838, he sailed from the Thames on his great adventure, traveled slowly on the long journey round the Cape of Good Hope, and arrived in Singapore in 1839. Here he met a shipwrecked crew, who had lately come from Borneo. They said they had been kindly treated by Muda Hassim, a native rajah in Borneo, and they asked Mr. James Brooke to take presents and letters of thanks to him, if he should be going thither in his yacht.

Mr. Brooke had not decided which of the many islands of the Eastern Archipelago he would visit, and he was as ready to go to Borneo as to any other. So, setting sail, he made his way up the Sarawak River, and anchored off Kuching on August 15, 1839. The country was nominally under the rule of the Sultan of Brunei, but his uncle, Rajah Muda Hassim, was then the greatest

power in the island. As he was favorable to English strangers, Mr. Brooke paid him the customary homage, and was favorably received and given full license to visit the Dyaks of Lundu.

The Rajah was at this time engaged in war with several fierce Dyak tribes in the province of Sarawak, who had revolted against the Sultan; but his efforts to quell this rebellion were ineffectual. The absolute worthlessness of the native troops under his command, and his own weakness of character, induced him to cling to Mr. Brooke, in whom he recognized a born leader of men, and he appealed for his help in putting down the insurgents and implored him not to leave him a prey to his enemies. The Rajah even offered to transfer the government of the province to Brooke if he would remain and take command. This offer he felt bound at the time to decline, but it led to his obtaining a position of authority at Sarawak useful for the purposes of trade.

With James Brooke's help the rebellion, which the Malay forces were too feeble to subdue, was effectually stayed. The insurgents were defeated in a battle in which Brooke, with the crew of his yacht and some Malay followers, took part. For his services on this occasion Muda Hassim conferred on him the title of Rajah of Sarawak, and this was the first step towards that larger sovereignty which he afterwards acquired. Some time elapsed, however, before the Sultan of Brunei could be induced to confirm the title. Mr. Brooke at once took vigorous action, making many reforms and introducing a system of administration far superior to any that the native authorities had ever dreamed of, and in September, 1841, the government of Sarawak and its dependencies was formally made over to him. In the following year the Sultan of Brunei confirmed what Rajah Muda Hassim had done, on the condition that the religion of the Mohammedans of the country should be respected.

And now Rajah Brooke found himself in a position of authority which enabled him to bring all his administrative powers into operation. He saw clearly that the development of commerce would be the most effective means of civilizing the natives, and to make this possible it was necessary to suppress the hideous piracy, which was not only a curse to the savage tribes, appealing as it did to their worst instincts, but a standing danger to both European and native traders in those seas.

In the suppression of piracy James Brooke found a vigorous ally in Captain (afterwards Admiral) Keppel, who, in command of H. M. S. *Dido*, was summoned from the China station in 1843 for this service. Various expeditions were organized and sent out against the marauders, the story of which has been told by himself. The pirates were attacked in their strongholds by Captain Keppel and other commanders of British ships. They fought desperately and the slaughter was immense. The pirate crews found the entrances to the rivers blocked up by English gunboats and their retreat cut off. These strenuous measures soon cleared the seas.

The practice of head-hunting was also dealt with by Sir James Brooke. He declared it to be a crime punishable with death, and by his vigorous treatment of head-hunting parties he gave the deathblow to this horrible national custom.

After his strenuous life in Sarawak, Sir James Brooke had a great desire to visit England. Besides other reasons, the wish to see his relatives and friends, he felt he could effect more for the inhabitants of Borneo by a personal interview with government ministers in England than by correspondence. He left Sarawak, and reached England early in October, 1847. There honors awaited him. He was presented with the freedom of the city of London; Oxford University conferred upon him the degree of LL. D.; he was graciously received at Windsor by the Queen and the Prince Consort. The British government recognized the work he had done, and appointed him Governor of Labuan and commissioner and consul general in Bor-

THREE DYAK BELLES DRESSED IN THEIR FINERY

The girls on the right and left wear collars worked with beads and colored threads. They are all wearing ear pendants and belts made of silver coins. From "Seventeen Years Among the Sea Dyaks of Borneo," by Edwin H. Gomes. J. B. Lippincott Co.

A DYAK GIRL

Seated on a mat and folding up a petticoat before putting it away. The girls are very careful of their clothing, and are often very vain, but when they are married they frequently become very untidy. A woman's wardrobe is not extensive. It consists of two petticoats and one jacket, as a general rule. From "Seventeen Years Among the Sea Dyaks of Borneo," by Edwin H. Gomes. J. B. Lippincott Co.

A DYAK GIRL

Round her body is the brass corset the women wear, and she has a necklace made of large buttons of brass or silver. From "Seventeen Years Among the Sea Dyaks of Borneo," by Edwin H. Gomes. J. B. Lippincott Co.

neo, and made him a K. C. B. The warrant of investiture was issued by Her Majesty on May 22, 1848.

The extirpation of piracy was the first step towards introducing into the country the blessings of a settled government, with all its civilizing influences. But he was not satisfied with this, and soon began to take measures for the establishment of a Christian mission in Sarawak. When Sir James Brooke visited England in 1847, he appealed to the Church, and especially to the two universities, to come to his aid.

Neither of the two great missionary societies was able at the time to undertake this new enterprise through lack of funds, and a new organization, the "Borneo Church Mission," was founded, which labored in the island for a few years. Then, in 1854, the Society for the Propagation of the Gospel in Foreign Parts was able to take up the work, and has ever since been responsible for it. The original organization had, however, done well in the choice of the missionaries it sent out, the first of whom was the Rev. F. T. McDougall, who was consecrated Bishop of Labuan and Sarawak in 1855.

My father, the Rev. W. H. Gomes, B. D., worked under Bishop McDougall as a missionary among the Dyaks of Lundu from 1852 to 1867, and I myself have worked, under Bishop Hose, as a missionary in Sarawak, for 17 years, and have thus gained an intimate knowledge of the people and of their lives, now so rapidly changing under western influence.

Sir James Brooke was a man of the highest personal character. That a young English officer, with a fortune of his own, should have been willing to devote his whole life to improving the condition of the Dyaks was a grand thing. That he should have been able, by perfectly legitimate means, to do this in the teeth of much official and other opposition; that he should have been able to put down piracy and head-hunting, with their unspeakable accompaniments of misery and cruelty, and to do it all with the hearty good-will of the people under his rule—this was indeed an achievement which might have seemed hardly possible.

The present Rajah of Sarawak, Sir Charles Brooke, is a nephew of the first Rajah. He joined his uncle in 1852, when he held the rank of lieutenant in the British navy. For ten years he played an important part in the arduous work of punishing rebels and establishing a sound government. In 1857, when the Chinese insurrection broke out, it was his action that led to the punishment of the insurgents and the restoration of peace. In 1863, on the retirement of the first Rajah, he assumed control of the country, and five years later, on the death of his predecessor, he became Rajah of Sarawak. Ever since he became the responsible ruler of the country Sarawak has advanced steadily and made great moral and material progress. To the general public the first Rajah will always appear the romantic, heroic figure; but, while yielding full measure of praise and admiration to the work of a great man, those who know the country will, I think, agree with me that the heavier burden of working steadily and unwearingly, when the romance of novelty had worn off, has been borne by his successor. With talents not less than those of his illustrious uncle, he has carried out, in the face of disappointments and the most serious obstacles, a policy of regeneration for which the striking exploits of Sir James Brooke merely paved the way.

There are occasional outbreaks among the Dyaks of the interior, and head-hunting still survives where natives think there is a chance of escaping detection and consequent punishment. But, happily, these are getting more and more rare and do not affect the prosperity or trade of the country.

The natives of Sarawak owe much to the Brookes. The work, nobly begun by Sir James Brooke, has been ably carried on by the present Rajah. To use his

own words: "He as founder, and myself as builder, of the State have been one in our policy throughout, from the beginning up to the present time; and now shortly I have to hand it to my son, and I hope that his policy may not be far removed from that of his predecessors."

PECULIAR FASHIONS

The Dyak is of rather greater stature than that of the Malay, though he is considerably shorter than the average European. The men are well proportioned, but slightly built. Their form suggests activity, speed, and endurance rather than great strength, and these are the qualities most required by dwellers in the jungle. Their movements are easy and graceful and their carriage erect. The women are generally smaller than the men. They have neat figures, and are bright, cheerful, and good-looking in their youth, but they age very soon.

The women wear their hair long and tied in a knot at the back of the head. Some of the women have beautiful raven black hair of great length. Wavy or curly hair is seldom seen.

The teeth are often blackened, as black teeth are considered a sign of beauty. The blackening is done by taking a piece of old cocoanut shell or of certain woods and holding it over a hot fire until a black resinous juice exudes. This juice is collected, and while still warm the teeth are coated with it. The front teeth are also frequently filed to a point, and this gives their face a curious doglike appearance. Sometimes the teeth are filed concavely in front, or else the front teeth are filed down till almost level with the gums. Another curious way of treating the front teeth is to drill a hole in the middle of each tooth and fix in it a brass stud. I was once present when this operation was in progress. The man lay down with a piece of soft wood between his teeth, and the "dentist" bored a hole in one of his front teeth. The agony the patient endured must have been very great, judging by the look on his face and his occasional bodily contortions. The next thing was to insert the end of a pointed brass wire, which was then filed off, leaving a short piece in the tooth; a small hammer was used to fix this in tightly, and, lastly, a little more filing was done to smooth the surface of the brass stud. I am told the process is so painful that it is not often a man can bear to have more than one or two teeth operated on at a time.

The Dyaks do not like beards, and much prefer a smooth face. In the whole course of my Dyak experience I have only met with one bearded man. The universal absence of hair upon the face, on the chest, and under the arm-pits might lead one to suppose that it was a natural deficiency. But this is not the case at all, as old men and chronic invalids, who by reason of age or infirmity have ceased to care about their personal appearance, have often chins covered with a bristly growth. The absence of hair on the face and elsewhere is due to systematic depilation. The looking-glass and tweezers are often seen in the hands of the young men, and they devote every spare moment to the plucking out of stray hairs. *Kapu,* or quicklime, which is one of the constituents of betel-nut mixture chewed by the Dyaks, is often rubbed into the skin to destroy the vitality of the hair follicles.

Among some tribes it is the fashion for both men and women to shave the eyebrows and pull out the eyelashes, and this gives their faces a staring, vacant expression. I have often tried to convince them of the foolishness of trying to improve upon nature in this way, and pointed out that both eyebrows and eyelashes are a protection to the eyes from dust and glare. But my remarks have made little impression on them. Among the Dyaks, as elsewhere, fashions die hard.

The Sea Dyak language is practically a dialect of Malay, which is spoken more or less over all Polynesia. It is not nearly so copious as other Malayan languages, but the Dyaks do not scruple to

DYAK CHILDREN

The figure on the right is a boy, the other five are girls. The children are fond of games, and are generally expert swimmers, but they have to make themselves useful, and help their parents very early in life. Dyak parents are very kind to their children, who, as a rule, return the affection and do as they are told from a desire to please them. From "Seventeen Years Among the Sea Dyaks of Borneo," by Edwin H. Gomes. J. B. Lippincott Co.

use Malay words in their conversation when necessary. The Dyak language is particulary weak in expressing abstract ideas. What the mind cannot grasp the tongue is not likely to express. I believe there is only one word—*rindu*—to express all the different varieties of love. On the other hand, the language is rich in words expressing the common actions of daily life. There are many words to express the different ways of carrying anything; one word for carrying in the hand, another for carrying on the back, and another for carrying on the shoulder.

### THEIR LONG COMMUNAL HOUSES

Among the Dyaks a whole village, consisting of some twenty or thirty families, or even more, live together under one roof. This village house is built on piles made of hard wood, which raise the floor from six to twelve feet above the ground. The ascent is made by a notched trunk or log, which serves as a ladder: one is fixed at each end of the house. The length of this house varies according to the number of families inhabiting it; but as the rooms occupied by the different families are built on the same plan and by a combination of labor, the whole presents a uniform and regular appearance.

The roof and outside walls are thatched with the leaves of the *nipa* palm, which are first made into *attap*. These are made by doubling the leaves

A LONG DYAK VILLAGE HOUSE

When a house is very long, as in this case, in addition to the ladders at each end, there are often extra ladders in the middle of the house. One of these ladders is seen on the right of the picture. The logs of wood on the ground are for walking upon. From "Seventeen Years Among the Sea Dyaks of Borneo," by Edwin H. Gomes. J. B. Lippincott Co.

DYAK HOUSES

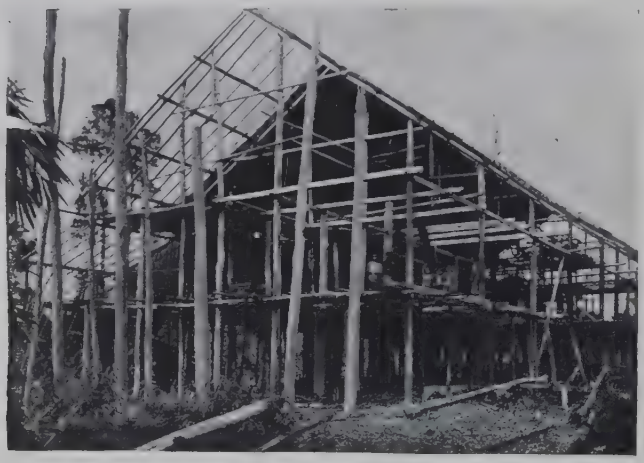
Showing the outside open platform, where paddy, etc., is put out to dry. Where the eaves are very low, parts of it are often raised to admit more light into the house. The palm trees in the picture are cocoanut palms. From "Seventeen Years Among the Sea Dyaks of Borneo," by Edwin H. Gomes. J. B. Lippincott Co.

over a stick about six feet long, each leaf overlapping the other, and sewn down with split cane or reeds. These *attap* are arranged in rows, each *attap* overlapping the one beneath it, and thus forming a roof which keeps off the rain and sun and lasts for three or four years.

The long Dyak village house is built in a straight line, and consists of a long uncovered veranda. The paddy is put on the veranda to be dried by the sun before it is pounded to get rid of its husk and convert it into rice. Here also the clothes and a variety of other things are hung out to dry. The family whetstone and dye vat are kept under the eaves of the roof, and the men sharpen their tools and the women do their dyeing on the veranda. The flooring of this part of the house is generally made of iron-wood, so as to stand exposure to the weather.

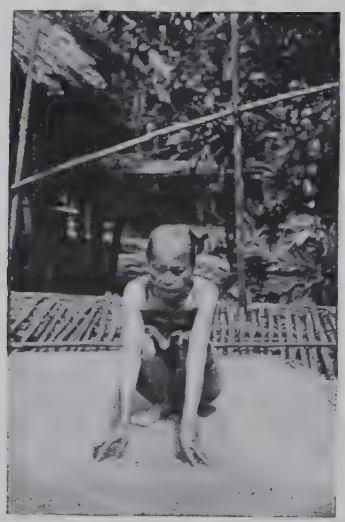
Next to the uncovered veranda comes the covered veranda, or *ruai*. This also stretches the whole length of the house, and the floor is made of bamboo, split into laths and tied down with rattan or cane.

This *ruai*, or public hall, is generally about twenty feet wide, and as it stretches the whole length of the house without any partition, it is a cool and pleasant place, and is much frequented by men and women for conversation and indoor pursuits. Here the women often do their work—the weaving of cloth or the plaiting of mats. Here, too, the men chop up the firewood, or even make boats, if not of too great a size. This



DYAK VILLAGE HOUSE IN COURSE OF CONSTRUCTION

This picture shows the arrangement of pillars and rafters of a Dyak house. The floor nearest the earth is divided into the long, open veranda and the rooms in which the different families live. Above this is the loft, where the paddy is stored away. Part of the roof in the picture has been covered with palm-leaf thatch.



DRYING PADDY

Before it is possible to rid the paddy of its husk and convert it into rice, it has to be dried in the sun. Here a woman is seen spreading out the paddy on a mat with her hands. She is on the outside veranda of the Dyak house (*tanju*). The long pole over her head is used by her to drive away the fowls and birds who may come to eat the paddy put out to dry. Photos from "Seventeen Years Among the Sea Dyaks of Borneo," by Edwin H. Gomes. J. B. Lippincott Co.

A HUSKING MILL (KISAR)

After the paddy is dried and before it is pounded, it is generally passed through a husking mill made in two parts—the lower half having a stem in the middle which fits into the upper part, which is hollow. The paddy is put into a cavity in the upper half, and a man or woman seizes the handles and works the upper half to the right and left alternately. The paddy drips through on to the mat on which this husking mill is placed.

THE TYPICAL RICE-HULLER OF BORNEO

It is made of extremely hard wood. The part with the handle fits down over the other piece. It is grooved on the inside, and the two pieces fit in together making an excellent huller. Photo from B. F. West.

long *ruai* is a public place open to all comers and used as a road by travelers, who climb up the ladder at one end, walk through the whole length of the house, and go down the ladder at the other end. The floor is carpeted with thick and heavy mats, made of cane interlaced with narrow strips of beaten bark. Over these are spread other mats of finer texture for visitors to sit upon.

The length of this covered veranda depends upon the number of families living in the house, and these range from three or four to forty or fifty.

Each family has its own portion of this *ruai,* and in each there is a small fireplace, which consists of a slab of stone, at which the men warm themselves when they get up, as they usually do, in the chill of the early morning before the sun has risen.

Over this fireplace hangs the most valuable ornament in the eyes of the Dyak, the bunch of human heads. These are the heads obtained when on the war-path by various members of the family—dead and living—and are handed down from father to son as the most precious heirlooms—more precious, indeed, than the ancient jars which the Dyaks prize so highly.

The posts in this public covered ve-

DYAK GIRLS POUNDING RICE

After the paddy has been passed through the husking mill it is pounded out in wooden mortars. Here are two girls at work. Each has her right foot in the upper part of the mortar to kick back any grains of paddy that may be likely to fall out. From "Seventeen Years Among the Sea Dyaks of Borneo," by Edwin H. Gomes. J. B. Lippincott Co.

randa are often adorned with the horns of deer and the tusks of wild boars—trophies of the chase. The empty sheaths of swords are suspended on these horns or from wooden hooks, while the naked blades are placed in racks overhead.

On one side of this long public hall is a row of doors. Each of these leads into a separate room, or *bilik*, which is occupied by a family. The doors open outwards, and each is closed by means of a heavy weight secured to a thong fastened to the inside. If the room be unusually large, it may have two doors for the sake of convenience.

This room serves several purposes. It serves as a kitchen, and in one corner there is a fireplace where the food is cooked. This fireplace is set against the wall of the veranda and resembles an open cupboard. The lowest shelf rests on the floor, and is boarded all round and filled with clay. This forms the fireplace, and is furnished with a few stones upon which the pots are set for cooking. The shelf immediately above the fireplace is set apart for smoking fish. The shelves above are filled with firewood, which is thoroughly dried by the smoke and ready for use. As the smoke from the wood fire is not conducted through the roof by any kind of chimney, it spreads itself through the loft and blackens the beams and rafters of the roof.

This room also serves as a dining-room. When the food is cooked, mats are spread here, and the inmates squat on the floor to eat their meal. There is no furniture, the floor serving the double purpose of table and chairs.

This *bilik* also serves as a bedroom. At night the mats for sleeping on are spread out here and the mosquito curtains hung up.

There is no window to let in the air and light, but a portion of the roof is so constructed that it can be raised a foot or two and kept open by means of a stick.

Round the three sides of this room are ranged the treasured valuables of the Dyaks—old jars, some of which are of great value, and brass gongs, and guns. Their cups and plates are hung up in rows flat against the walls. The flooring

DYAK GIRL SPINNING

She is seated on a mat, in a characteristic attitude, and is making yarn out of the cotton, using a primitive spinning-wheel. The corset must be very uncomfortable, as the wearer can hardly bend the body. From "Seventeen Years Among the Sea Dyaks of Borneo," by Edwin H. Gomes. J. B. Lippincott Co.

is the same as that of the veranda, and is made of split palm or bamboo tied down with cane. The floor is swept after a fashion, the refuse falling through the flooring to the ground underneath. But the room is stuffy and not such a pleasant place as the open veranda. The pigs and poultry occupy the waste space under the house.

From the *bilik* there is a ladder which leads to an upper room, or loft (*sadau*), where they keep their tools and store their paddy. If the family be a large one, the young unmarried girls sleep in this loft, the boys and young men sleeping outside in the veranda.

### CATCHING FISH WITH POISON

The Dyaks have many varieties of fish-traps, which they set in the streams and rivers. Most of these are made of split bamboo.

They also have nets of various kinds; the most popular is the *jala*, or circular casting-net, loaded with leaden or iron weights in the circumference, and with a spread sometimes of 20 feet. Great skill is shown by the Dyak in throwing this net over a shoal of fish which he has sighted. He casts the net in such a manner that all the outer edge touches the water almost simultaneously. The weights cause it to sink and close together, encompassing the fish, and the net is drawn up by a rope attached to its center, the other end of which is tied to the fisherman's left wrist. The thrower of this net often stands on the bow of a small canoe, and shows great skill in balancing himself. The *jala* is used both

DYAKS MAKING A DAM FOR TUBA-FISHING

The poison from the *tuba* root is put in the water some distance up river, and the Dyaks follow it as it drifts, and spear and net the poisoned fish. The *tuba* does not seem to affect the flesh of the fish, which can be cooked and eaten. Many fish swim down river to escape the poison. These come to this dam, in which there is an opening leading to an enclosure; in this the fish congregate and are afterwards captured. From "Seventeen Years Among the Sea Dyaks of Borneo," by Edwin H. Gomes. J. B. Lippincott Co.

in fresh and salt water, and can be thrown either from the bank of a river or by a man wading into the sea.

But the most favorite mode of fishing among the Dyaks is with the *tuba* root (*Cocculus indicus*). Sometimes this is done on a small scale in some little stream. Sometimes, however, the people of several Dyak houses arrange to have a *tuba*-fishing. The men, women, and children of these houses, accompanied by their friends, go to some river which has been previously decided upon. A fence made by planting stakes closely together is erected from bank to bank. In the middle of this there is an opening leading into a square enclosure made in the same fashion, into which the fish enter when trying to escape from the *tuba* into fresh water. The canoes then proceed several hours' journey up the river, until they get to some place decided on beforehand. Here they stop for the night in small booths erected on the banks of the river. The small boats are cleared of everything in them, so as to be ready for use the next day.

All the people bring with them fishing-spears and hand-nets. The spears are of various kinds; some have only one barbed point, while others have two or three. The shaft of the spear is made of a straight piece of bamboo about six feet long. The spear is so made that when a fish is speared the head of the weapon comes out of the socket in the

bamboo; but as it is tied on to the shaft, it is impossible for the fish to escape. Even when the fisherman throws his spear at the fish, there is little chance of the fish escaping, because the bamboo bears it to the surface, and it is easy for the men to pick up the bamboo shaft and thus secure the fish.

Most of the people bring with them some *tuba* root, made up into small, close bundles the thickness of a man's wrist and about six inches long. Early the next morning some of the canoes are filled with water, and the root is beaten and dipped into it. For an hour or so 50 or more clubs beat a lively tattoo on the root bundles as they are held to the sides of the boats. The *tuba* is dipped into the water in the boat and wrung out from time to time. This gives the water a white, frothy appearance like soapsuds. The Dyaks, armed with fish-spears and hand-nets, wait in readiness in their canoes.

At a given signal the poisoned liquid is baled out into the stream, and the canoes, after a short pause, begin to drift slowly down the current. The fish are stupefied by the *tuba*, and, as they rise struggling to the surface, are speared by the Dyaks. The large fish are thus secured amid much excitement, several canoes sometimes making for the same spot where a large fish is seen. The women and children join in the sport, and scoop up the smaller fish with hand-nets. The *tuba* does not affect the flesh of the fish, which can be cooked and eaten.

This form of fishing, when carried out on a large scale, is always a great event among the Dyaks, because besides the large amount of fish secured on these occasions there is always a great deal of fun and excitement, and it is looked upon as a pleasant sort of picnic.

### HUNTING CROCODILES

For superstitious reasons the Dyaks do not interfere with the crocodile until he has shown some sign of his man-eating propensity. If the crocodile will live at peace with him, the Dyak has no wish to start a quarrel. If, however, the crocodile breaks the truce and kills some one, then the Dyaks set to work to find the culprit, and keep on catching and killing crocodiles until they find him. The Dyaks generally wear brass ornaments, and by cutting open a dead crocodile they can easily find out if he is the creature they wish to punish. Sometimes as many as 10 crocodiles are killed before they manage to destroy the animal they want.

There are some men whose business it is to catch crocodiles, and who earn their living by that means; and whenever a human being has fallen a victim to one of these brutes, a professional crocodile catcher is asked to help to destroy the murderer. The majority of natives will not interfere with the reptiles or take any part in their capture, probably fearing that if they did anything of the kind they themselves may some time or other suffer for it by being attacked by a crocodile.

A DYAK IN WAR DRESS

Holding up his shield in readiness to receive the attack of the enemy. He is holding his sword in his right hand. The shield is decorated with human hair. From "Seventeen Years Among the Sea Dyaks of Borneo," by Edwin H. Gomes. J. B. Lippincott Co.

FIVE DYAKS IN WAR DRESS WITH SPEARS AND SHIELDS

The spears are made of steel and have shafts of hard, heavy wood. The shields are each cut out of one piece of wood, and are often colored with some fantastic design. Sometimes, as in the case of the man's shield on the left, cross-pieces of cane or wood are fixed in the shield to prevent it splitting. The second man on the left is wearing a large sleeveless jacket, or collar, of skin to protect his shoulders from wounds. From "Seventeen Years Among the Sea Dyaks of Borneo," by Edwin H. Gomes. J. B. Lippincott Co.

A SEA DYAK WITH SHIELD

He is dressed in the usual waist-cloth the Dyaks wear. On his head is a headkerchief decorated with a fringe. He wears a necklace of large silver buttons. On his arms are sea-shell bracelets and on his calves a large number of palm fiber rings. His right hand is holding the handle of his sword, the sheath of which is fastened to his belt, and his left hand is on his shield. The shield is made out of one piece of wood and colored with a fanciful design. It is decorated with human hair from the heads of dead enemies. From "Seventeen Years Among the Sea Dyaks of Borneo," by Edwin H. Gomes. J. B. Lippincott Co.

A DYAK USING A WOODEN BLOW-PIPE

He is seated on the ground with his blow-pipe held in position to his mouth. He is just in the act of blowing out one of his poisoned darts, some of which are lying on the ground in front of him. To his waist is fastened the bamboo receptacle in which the darts are kept. From "Seventeen Years Among the Sea Dyaks of Borneo," by Edwin H. Gomes. J. B. Lippincott Co.

HUMAN HEADS

The heads of slain enemies are smoked and preserved and looked upon as valuable possessions. The above is a bunch of old heads as they appear hanging from the rafters of a Dyak house. From "Seventeen Years Among the Sea Dyaks of Borneo," by Edwin H. Gomes. J. B. Lippincott Co.

DYAK MAKING A BLOW-PIPE

He is seen here shaping the outside of the blow-pipe. The hole is bored while the wood is about six inches in diameter, and it is then pared down to about two inches. From "Seventeen Years Among the Sea Dyaks of Borneo," by Edwin H. Gomes. J. B. Lippincott Co.

Photo from B. F. West

DR. B. F. WEST AND SIX DYAKS IN BORNEO

The ordinary way of catching a crocodile is as follows: A piece of hard wood about an inch in diameter and about 10 inches long is sharpened to a point at each end. A length of plaited bark of the *baru* tree about 8 feet long is tied to a shallow notch in the middle of this piece of wood, and a single cane or rattan 40 or 50 feet long is tied to the end of the bark rope and forms a long line.

The most irresistible bait is the carcass of a monkey, though often the body of a dog or a snake is used. The more overpowering the stench the greater is the probability of its being taken, as the crocodile will only swallow putrefying flesh. When a crocodile has fresh meat, he carries it away and hides it in some safe place until it decomposes. This bait is securely lashed to the wooden bar, and one of the pointed ends is tied back with a few turns of cotton to the bark rope, bringing the bar and rope into the same straight line.

The next thing is to suspend the bait from the bough of a tree overhanging the part of the river known to be the haunt of the animals. The bait is hung a few feet above the high-water level, and the rattan line is left lying on the ground, and the end of the rattan is planted in the soil.

Several similar lines are set in different parts of the river, and there left for days, until one of the baits is taken by a crocodile. Attracted either by the smell or sight of the bait, some animal raises itself from the water and snaps at the hanging bundle, the slack line offering no resistance until the bait has been swallowed and the brute begins to make off. Then the planted end of the line holds sufficiently to snap the slight thread binding the pointed stick to the bark rope. The stick thus returns to its original position, at right angles to the line, and becomes jammed across the crocodile's stomach, the two sharpened points fixing themselves into the flesh.

Photo from B. F. West

DYAK CHIEF MONANG, OF THE REJANG RIVER, BORNEO, WITH HIS WIFE AND HIS FOLLOWERS

Next morning the trappers search for the missing traps, and seldom fail to find the coils of floating *rotan*, or cane, on the surface of some deep pool at no great distance from the place where they were set. A firm but gentle pull soon brings the crocodile to the surface, and if he be a big one he is brought ashore, though smaller specimens are put directly into the boat and made fast there.

Sometimes the cotton holding the bar to the line fails to snap. In that case the crocodile, becoming suspicious of the long line attached to what he has swallowed, manages to disgorge the bait and unopened hook in the jungle, where it is sometimes found. But should the cotton snap and the bar fix itself in the animal's inside nothing can save the brute.

The formidable teeth of the crocodile are not able to bite through the rope attached to the bait, because the *baru* fibers of which the rope is made get between his pointed teeth, and this bark rope holds, no matter how much the fibers get separated.

Professional crocodile catchers are supposed to possess some wonderful

A BORNEO DYAK CHIEF, HIS WIFE, AND SEVERAL SLAVE GIRLS, THE CHILDREN OF MEN WHOM HE HAS SLAIN

The chief wears a cast-off military suit given him by the Rajah. Photo from B. F. West

power over the animals, which enables them to land them and handle them without trouble. I have seen a man land a large crocodile on the bank by simply pulling gently at the line. But this is not surprising, as from the crocodile's point of view there is nothing else to do but follow, when every pull, however gentle, causes considerable pain.

The rest of the proceeding is more remarkable. The animal is addressed in eulogistic language and beguiled, so the natives say, into offering no resistance. He is called a "rajah amongst animals," and he is told that he has come on a friendly visit, and must behave accordingly. First the trapper ties up its jaws—not a very difficult thing to do. The next thing he does appears to me not very safe. Still speaking as before, in high-flown language, he tells the crocodile that he has brought rings for his

fingers, and he binds the hind legs fast behind the beast's back, so taking away from him his grip on the ground, and consequently his ability to use his tail. When one remembers what a sudden swing of the muscular tail means, one cannot help admiring the man who coolly approaches a large crocodile for the purpose of tying his hind legs. Finally the fore legs are tied in the same way over the animal's back. A stout pole is passed under the bound legs and the animal is carried away. He is taken to the nearest government station, the reward is claimed, and he is afterwards cut open and the contents of his stomach examined.

Though the animal is spoken to in such flattering terms before he is secured, the moment his arms and legs are bound across his back and he is powerless for evil, they howl at him and deride him for his stupidity.

The professional crocodile catchers are generally Malays, who are sent for whenever their services are required. But there are Dyaks who have given up their old superstitious dread of the animal and are expert crocodile catchers.

### EDIBLE BIRDS' NESTS

Sometimes the Dyaks join others in the collection of edible birds' nests for the Chinese market. This is a great industry in those parts of Borneo where there are large limestone caves in which these nests are found. The caves are farmed out by government, and whatever is obtained over the amount paid to government is the profit of the workers. In Upper Sarawak certain tribes possess caves in which edible birds' nests are found, and they divide the nests with the government.

Sometimes Dyaks who wish to earn a little extra money go and help these tribes in collecting birds' nests and get a share of the profits, or more often they go to small caves which belong to no one in particular and collect birds' nests for themselves, and then give a share of what they find to the government.

Some of the caves in which edible birds' nests are found are very large. At the entrance the visitor is met by thousands of bats and swallows. The latter resemble the common swallow in appearance, but are only half as large. These small swallows make the edible nests. Inside, the cave is often like an immense amphitheater roofed like a dome, the middle of which is over a thousand feet high. Thousands of nests are seen clinging to the pillar-like rocky sides and roof. The most flimsy-looking stages of bamboos tied together with cane are the simple means employed by the natives to collect the nests from the seemingly most inaccessible positions.

Though there are rifts in the sides through which come rays of light, still in parts the cave is so dark that lamps and torches have to be used.

The Dyaks climb up the bamboo scaffolding, carrying with them long cane ladders. These are fixed against the sides. Two men work on each ladder, which often hangs high up in the air. One carries a light four-pronged spear about fifteen feet long, and near the prongs a lighted candle is fixed. Holding on to the ladder with one hand, he manages the spear with the other, and transfixes the nest. A slight push detaches it from the rock, and the spear is then held within reach of a second man, who detaches the nest and puts it into a basket tied to his waist.

The natives say that there are two species of swallows that inhabit these caves. Those that take up their abode near the entrance of the cave build nests which are of no value. These birds often attack the other and smaller species which make the edible nests. The natives often destroy the nests of the larger swallows, so as to lessen their number.

The best quality nests are very translucent, and of a pale yellow color, and mixed with very few feathers. These are nests that have been freshly made. If the nests are not removed, the birds make use of them again, so that by age

and accession of dirt they become quite useless. The old nests are of no value, and the natives destroy them, so that the birds may build new ones in their place.

The nests are collected four times a year. The natives say that the birds will lay four times a year if their nests are collected often, but if there are only two collections, then the birds only lay twice in the year. The best time for collecting nests is when the eggs are just laid. One would imagine that there would be a danger of over-collecting, and that the number of birds would diminish, but the natives say there is no danger of this, as the birds carry on their breeding in nooks and crannies inaccessible to the collectors.

### THE ORDEAL BY DIVING

The practice of referring disputed questions to supernatural decision is not unknown to the Dyaks. They have the trial by ordeal, and believe that the gods are sure to help the innocent and punish the guilty. I have heard of several different methods, which are seldom resorted to nowadays. The only ordeal that I have frequently seen among the Dyaks is the ordeal by diving. When there is a dispute between two parties in which it is impossible to get any reliable evidence, or where one of the parties is not satisfied with the decision of the headman of the Dyak house, the diving ordeal is often resorted to.

Several preliminary meetings are held by the representatives of both parties to determine the time and place of the match. It is also decided what property each party should stake. This has to be paid by the loser to the victor. The various articles staked are brought out of the room and placed in the public hall of the house in which each litigant lives, and there they are covered up and secured.

The Dyaks look upon a diving ordeal as a sacred rite, and for several days and nights before the contest they gather their friends together, and make offerings and sing incantations to the spirits, and beg of them to vindicate the just and cause their representative to win. Each party chooses a champion. There are many professional divers who for a trifling sum are willing to undergo the painful contest.

On the evening of the day previous to that on which the diving match is to take place each champion is fed with seven compressed balls of cooked rice. Then each is made to lie down on a fine mat, and is covered with the best Dyak woven sheet they have; an incantation is made over him, and the spirit inhabitants of the waters are invoked to come to the aid of the man whose cause is just.

Early the next morning the champions are roused from their sleep and dressed each in a fine new waist-cloth. The articles staked are brought down from the houses and placed upon the bank. A large crown of men, women, and children join the procession of the two champions and their friends and supporters to the scene of the contest at the riverside. As soon as the place is reached, fires are lit and mats are spread for the divers to sit on and warm themselves. While they sit by their respective fires the necessary arrangements are made.

Each party provides a roughly-constructed wooden grating to be placed in the bed of the river for his champion to stand on in the water. These are placed within a few yards of each other, where the water is deep enough to reach the waist, and near each a pole is thrust firmly in the mud for the man to hold on to when he is diving.

The two men are led out into the river, and each stands on his own grating grasping his pole. At a given signal they plunge their heads simultaneously into the water. Immediately the spectators shout aloud at the top of their voices, over and over again, "*Lobon—lobon,*" and continue doing so during the whole contest. What these mysterious words mean I have never been able to discover. When at length one of the champions shows signs of yielding, by

his movements in the water and the shaking of the pole he is holding to, the excitement becomes very great. *"Lobon—lobon,"* is shouted louder and more rapidly than before. The shouts become deafening. The struggles of the poor victim, who is fast becoming asphyxiated, are painful to witness. The champions are generally plucky, and seldom come out of the water of their own will. They stay under water until the loser drops senseless, and is dragged ashore apparently lifeless by his companions. The friends of his opponent, raising a loud shout of triumph, hurry to the bank and seize and carry off the stakes. The vanquished one, quite unconscious, is carried by his friends to the fire. In a few minutes he recovers, opens his eyes and gazes wildly around, and in a short time is able to walk slowly home. Next day he is probably in high fever from the effects of his dive. When both champions succumb at the same time, the one who first regains his senses is held to be the winner.

I have timed several diving contests, and where the divers are good they keep under water between three and four minutes.

Among some tribes of Dyaks the champion is paid his fee whether he wins or loses. They say it is not the fault of the diver, but because his side is in the wrong, that he is beaten. Among other tribes, however, no fee is given to the losing champion, so he comes off very poorly indeed.

There are certain cases where diving seems to be the only means of a satisfactory decision. Take the case of the ownership of a durian tree. The tree probably does not bear fruit till fifteen years after it has been planted. Up to that time no one pays any attention to it. When the tree begins to bear fruit, two or three lay claim to it. The man who originally planted it is probably dead, and no one knows for certain to whom the tree belongs. In a case like this no amount of discussion can lead to a satisfactory decision, whereas a diving contest settles the matter to the satisfaction of all parties.

The Dyaks have great faith in the diving ordeal, and believe that the gods will always maintain right by making the man who is in the wrong be the loser. In fact, if a Dyak refuses the challenge of a diving ordeal, it is equivalent to his admitting that he is in the wrong.

# TUNIS OF TODAY

By Frank Edward Johnson

*With Photographs by Messrs. Lehnert and Landrock, of Tunis*

TUNIS, the capital of Tunisia, situated on the coast of northern Africa, is considered one of the most beautiful cities of the Orient. It has a mixed population of over 200,000: about 100,000 Arabs, 50,000 native Jews, 14,000 French, 50,000 Italians and Sicilians, and several thousand Greeks and Maltese.

Tunisia was an absolute monarchy until 1881, when, on May 18, the "Treaty of the Bardo" made it a French protectorate. It is governed by an Arab bey, who is advised by a resident general from France. The latter is in reality chief executive.

Tunisia is divided into 38 "caidships," or provinces, which are supervised by French officials with the title of "contrôleurs civils." The extreme south of Tunisia is under martial law.

Tunis is called by the Arabs "The White Bernous of the Prophet." Its houses are all flat-roofed and creamy

NATIVE ARAB CAVALRY COMMANDED BY FRENCH OFFICERS; THESE PARTICULAR MEN ARE NOW AT MOROCCO

A "FANTASIA," WHERE HORSE AND RIDER COMPETE AGAINST EACH OTHER TO THE PLAYING OF A PIPE AND TOM-TOM

white in color. Minarets point heavenward from every square, and from their tops may be heard the "call to prayer of the faithful" five times a day: "Allah is Allah. There is no God but Allah; Mohammed is his prophet."

Tunis has changed greatly since 1881. A large and attractive French town has sprung up outside the walls of the native city. Broad boulevards, with rows of palms and various shade trees; large shops, with tempting displays; modern hotels, with every comfort and luxury; restaurants, cafés, and garages for the motors that come in greater numbers every season. Trolleys run in all directions, and Carthage can be reached in 25 minutes.

The native town is the great attraction, with its "souks," or bazars, and its streets of various guilds, where for an entire street only one trade is followed: The streets of the shoemakers, where hundreds of men and boys are busy making the yellow or red morocco leather slippers, or red-top boots for riding; the street of the gun-makers, where one can watch the long-barreled gun, beloved by the Arabs, being damascined with silver and sometimes gold; the street of the coppersmiths and numerous streets of weavers.

Friday is the Arab Sunday, when all the women go in the morning to the cemeteries to pray. One passes hundreds of them chatting together, dressed in their silvery white "haiks" and black face-veils. Many of the women of the wealthier families, instead of a face-veil, wear a broad scarf of heavy dark silk,

PANORAMA OF TUNIS FROM THE PALACE OF DAR-EL-BEY

ARAB CAFÉ: TUNIS

THE PLACE BAB-SUIKA: TUNIS (SEE PAGE 730)

STREET SCENE: TUNIS

FRUIT VENDER: TUNIS

which covers their face and is held out in front by the arms of the wearer. All she can see is a few steps in front of her feet. These wealthy women are usually followed by several female attendants.

Place Bab-Suika is one of the most animated scenes in a town where every street teems with life. The great domes of the mosque form a picturesque background for a multi-colored throng of moving humanity, so dense that it is difficult to walk about.

Here early in the morning are to be found great piles of freshly picked fruit and vegetables brought in from the surrounding country.

A tiny donkey with paniers filled with oranges shoves you up against the wall of the narrow street as he passes, and we wonder what the vender is crying. It sounds weird, but translated means only "Oranges—sweeter than honey."

Passing through the "Porte de France," one of the numerous gateways into Tunis, we walk up the crowded and narrow Rue de l'Eglise, where Arab, Jew, Greek, Italian, French, and tourist rub shoulder to shoulder. At the end of the street is the large "Mosque of the Olive Tree" (Djamma Zitouna). A sign in large letters warns one in French, English, German, and Italian: "Reserved for Moslem worship. Entrance forbidden." The glimpses one has of the interior make one long to enter.

Leaving the mosque, to our left we come to the Souk of the Perfumers. Here in small niches sit the venders, looking like live Buddas. Attar of rose, jasmine, amber, and rose geranium are the favorite scents. Should one be unfortunate enough to have a guide, instead of the oriental perfume a coal-tar product will be substituted, which comes

BUTCHER SHOP: TUNIS

direct from Germany. A large business is done in these German scents, so perfectly imitated that it takes a connoisseur to tell the difference. The guides are a band of robbers and demand 50 per cent or more commission on all purchases.

Entering one of the largest souks, steaming Turkish coffee is brought us in tiny cups, while oriental rugs, silks, jewels, and antique weapons are shown us.

The souks are picturesque and fascinating places, where time passes all too rapidly. A rug should be looked at in various lights; its color and texture discussed and its price debated, and many cups of coffee and quantities of cigarettes consumed before its eventual purchase. Not to accept a cup of coffee is almost an offense, and it is always offered. The merchants in the souks are keen tradesmen, and the prices vary according to the appearance of the purchaser. The original price is always greatly in excess of what is expected. One of the most picturesque souks is that of the saddle and harness makers. The tomb of a maribout (holy man) is in the center of the street, and on fête days there are beautiful old flags. The color effects are impossible to describe and most difficult to paint.

The Arab saddles and bridles have mountings of silver and panther and leopard skins. The leather is of red morocco, or a pale yellow, and harnesses,

STREET SCENE: TUNIS

saddle-bags, and purses are ornamented with silken embroidery and gold and silver threads.

Most of the souks are roofed over as a protection against the great heat, and small square holes are left for ventilation, so that the effects of sunlight sifting through are very curious and make photographing them almost impossible.

Maribouts are built in the most unexpected spots, and are often not actual tombs, but spots made holy by some maribout during his lifetime and built on after his death. A hermit, a saint, or a crazy man are always maribouts and very fanatic.

The little fruit-shops are most attractively arranged and very artistic in regard to color. The love of flowers and color seems inborn to all Arabs. Even the smallest café has great bunches of flowers, and the butcher standing in his tiny shop has a rosebud and golden marigolds stuck over his ear. The blue-green antique tiles around his shop are worthy of being shown in a museum.

Many of the Arab entrances and courtyards are built of materials taken from the Roman ruins. The old Moorish arches are exceedingly graceful in form and the despair of modern architecture to reproduce.

In the afternoon a large crowd is always to be found at the Place Sidi-Bayan watching the snake-charmer and his large hooded cobras and other snakes. Some of the snakes are wriggling on the ground, with a large stone on top of each of their tails so that they cannot get away. The snake-charmer's head resembles that of a male Medusa, as several snakes are twined about, while two huge cobras are coiled on the ground ready to strike as the snake-charmer approaches. They seem hypnotized, but they hate him and strike his face again

IRON-BARRED WINDOW OF DAR-EL-BEY, WHERE THE BEY THROWS COINS TO THE POOR BELOW

and again, until his nose and cheeks are dripping with blood. Each time they strike they puff out their broad hoods. The snakes are carried from place to place in long leather bags. The snake-charmers come from the south and are usually fine types, but resent being photographed, as do all Mohammedans, so that photography is wrought with difficulty.

The large market, built since the French occupation, near the post-office, is worth an early morning visit, and gives one an idea of the products of the country.

The market-place occupies an entire block and has four entrances: a wide arcade runs around three sides, leaving a large open square in the center. Out here are the stalls for the sale of vegetables, fruit, and fish. For retail purchases it is better to buy in the arcade.

Squatted in the vaulted gateway is a row of Sudanese women as black as ebony, with their small cream cheeses and little pyramid-shaped cakes placed on large green leaves before them. They seem to do a thriving business, for as a rule about 10:30 o'clock all their wares have been sold. The crowd coming and going reminds one of the subway on a busy afternoon, save that it is an oriental lot of people in quaint and picturesque costumes. Passing through the entrance, one comes into a large hall. At the left is sold olive oil by the quart or barrel; to

ENTRANCE TO SOUK OF SADDLE AND HARNESS MAKERS: TUNIS

THE SNAKE-CHARMER: TUNIS

A SCENE TOO FREQUENTLY MET WITH IN NORTHERN AFRICA: BLINDNESS FROM NEGLECT WHEN AN INFANT

ARAB GROCERY STORE; TUNIS

ENTRANCE TO ARAB HOUSE: TUNIS

THE FACADE OF A MOORISH HOUSE

COURTYARD OF MOORISH HOUSE

the right is a fish market, where fish are auctioned off to the highest bidder, in lots of from one to seven pounds.

Keeping on through another vaulted gateway, some Arab women are selling snails and bunches of lettuce and asparagus and large and small turtles, which are supposed to bring good luck. The poultry venders have a place for themselves, where live chickens, ducks, and pigeons are to be bought, on one side of the arcade, and on the opposite side are the freshly plucked chickens, pigeons, and quantities of native quail, much smaller than ours in America. The vegetable booths have fresh beets, carrots, radishes, artichokes, cauliflowers, peas, onions, string beans, and other varieties of beans unknown in New England, new potatoes, and large squash cut into slices. The fruits for sale in April are dates, oranges of all varieties, mandarins, lemons, sweet lemons—a fruit greatly esteemed by the Arabs, very juicy, but insipid—and a curious pear-shaped blood orange, bananas of a small variety, but excellent in flavor. Nespolies of Japan are greatly liked and thrive in this soil. Later in the season come grapes, figs, melons, apricots, peaches, pears, and apples, pomegranates, and strawberries; also almonds and pistache, which is used in great quantities in making bon-bons by the natives. A date stuffed with freshly prepared pistache is delicious.

The natives eat the fruit of the prickly-pear cactus. Unfortunately, the new variety without thorns, lately developed by Mr. Burbank, has not been imported into Tunisia, and its cultivation might prove a failure, as the prickly-pear cacti are used almost entirely instead of fences. They only cost the labor, and once grown their sharp thorns, finer than a needle and irritating to the skin, keep out man and beast. The butcher-shops have beef, mutton, and pork, and there are two stalls at market where only horse-meat is sold.

At the slaughter-house there are three separate divisions—one for the Europeans, one for the Jews, and a third for the Mohammedans, where the animal to be killed has to face toward Mecca.

Arabs are extremely fond of fish, and the waters of the Mediterranean and the numerous salt lakes in Tunisia abound with many species unknown in Europe and America. Many fish thrown away or used as lobster bait on our Atlantic coast are considered excellent over here. For instance, none of us has ever thought of eating a "skate." How our Gloucester fishermen despise them! Yet many of us who have lived in France have eaten them without knowing, thinking it was turbot.

Tell an old Maine fisherman that you had eaten a dogfish and he would consider you almost as bad as a cannibal. Yet early this morning I saw hundreds of dogfish, small sharks, and very large skates being eagerly bought at the market. Among the fish that I had seen before were soles, mackerel, red mullet, tangfish weighing from 70 to 200 pounds, and merling, large and small, with their tails in their mouths. Why are fried merling always served that way in France? At an Arab fish-monger's in the hall in the market reserved especially for seafood, a large octopus was gracefully arranged, so that his body made a huge rosette; his tentacles formed long loops—a sort of gothic-arch effect; above were light and airy arches of a species of soft-shell crab, still alive. Dangling from the loops made by the octopus were two large silvery fish with iridescent colors, their tails bent up like the figure six, their mouths wide open, holding feathery bunches of flowers.

On the counter were quantities of squids and large shrimps, from three to four inches long, and langoustes (very like a lobster), and various kinds of fish, all arranged so that the colors harmonized; here and there a bunch of flowers to set off the color of the fish. Everything was spotlessly clean.

In the days of Rome northern Africa (Tunisia) was called the "granary of the world," for the Roman system of irrigation was marvelous and the soil

A BEDOUIN GIRL: CARTHAGE

WEALTHY ARAB WOMEN OF TUNIS

fertile wherever water was to be had, and it was to be found in abundance in the mountains. The aqueduct, built under Hadrian, about 136 A. D., supplied Carthage with 32 million liters of water a day (somewhat over eight million gallons).

The invasion of the Vandals, Arabs, Berbers, Spaniards, and Turks laid waste the fertile plains, filled up the wells, and destroyed the aqueducts, so that the French found deserts where the Romans left gardens. Their task of reconstruction has not been a light one, but the change wrought since 1881 is wonderful, and the cultivation of cereals is once more on the increase.

History tells how the "Province of Egypt" was taxed in grain, and how an annual tribute of 144 million bushels of grain were sent to Rome by the "Egyptian fleet."

In the golden days of proconsular Africa these figures were more than doubled, and the grain was paid for, not sent as a tribute. No wonder that mosaics and statues of Africa represent her allegorically as a young girl holding great ears of corn in her hands, or with her arms clasping horns of plenty, overflowing with cereals and fruit.

At Rome during the fourth century A. D. African olive oil was preferred above all others, and Cæsar taxed the community of "Little Leptis" three million pounds of oil per annum for the Roman baths.

Today Tunisia has over ten million

WEALTHY ARAB WOMAN ON WAY TO CEMETERY, FOLLOWED BY FEMALE ATTENDANTS: TUNIS

ARAB WOMEN WAITING AT CEMETERY GATE

olive trees under cultivation, and they cover an area of about two hundred thousand hectares.

The cereals now grown in Tunisia are wheat and barley, oats, corn, and what is known here as "sorgho." The latter is of great value to the native, and is a sort of poor man's wheat when other crops fail. Three varieties are grown—white sorgho, used for food; yellow sorgho, which makes rather a coarse meal, and another variety, used as a chicken food.

April 13 marks the commencement of the Jewish "Feast of Unleavened Bread," or Purim, when no business is done and unleavened bread must be eaten for seven days (Exodus 12 : 3-30). Beside each door in the Jewish quarter of Tunis was a bloody stain of the hand of "Fatima."

It is curious to see how Moslem and Jewish traditions become intermingled in the course of centuries. Fatima was the beloved wife of Mohammed, and her hand is supposed to bring good luck. Yet today on all doorways was the blood stain or imprint of a woman's little hand.

Last night 90 Jewish weddings took place, and that quarter of Tunis was "en fête," and every one, dressed in their best clothes, was walking about in the narrow streets to see the wedding processions.

The noise was deafening, as each marriage procession was preceded by native Arabs beating tom-toms and playing bagpipes or flageolets; small Jewish children in native costumes followed, carrying flowers. Then came men relations and friends bearing very tall and gaudy

COSTUME OF ARAB WOMEN, WHITE HAIKS AND BLACK FACE-VEILS: TUNIS

JEWISH WOMEN WALKING: TUNIS

candles. Then the bride and groom, dressed, alas, in European clothes, with bridal veil and orange blossoms, followed by the wedding guests in all the Jewish oriental splendor.

When the bride passed the houses of her friends, the procession would halt while the bride's veil was lifted, and the women would kiss her. Many of the young girls and brides were very beautiful, and the brides seemed young—between 15 and 17 years old. But in this country women develop far more rapidly than with us.

The wedding ring is worn on the first finger of the left hand, and the fingernails and toes are stained red with henna, and on the day of her marriage her eyebrows are painted so that they meet over the nose. Over the entrance to the home of the newly married couple is fastened a gilded pair of horns and a hand of Fatima to keep off the "Evil Eye."

Saturday afternoon (the Jewish Sabbath) many of the women are to be seen walking in the belvedere (the large park) in their curious costumes and their peaked golden caps. Unlike the Arab

THE ROMAN ARENA: CARTHAGE. CROSS SHOWS WHERE CHRISTIAN MARTYRS WERE THROWN TO WILD BEASTS, 202 A. D.

women, they never go veiled. Civilization is changing ancient customs and costumes, so that today the wealthy Jewish families dress in European clothes. A smart station wagon with fine horses dashes into the park. Out step three very stout but handsome Jewish women, dressed in the latest Parisian fashion. Their children, two boys and one girl, jump down and run off to play with their French poodle. All are talking French.

Twenty years ago I saw these same women, then young girls of about 16, walking with their mothers, who were tremendously stout, weighing at least 250 pounds each. They were dressed in skin-tight satin knee-breeches, golden gaiters, short slippers ending under the instep, a sort of bolero jacket with masses of golden embroidery, a tall cornucopia-shaped cap of gold, with a fine veil flowing from the point.

On a hill just outside the walls of Tunis is one of the large cemeteries. Friday mornings are devoted to the Arab women, no men being allowed. Each one that comes picks up a small stone and places it on the top of the tomb of their relative or friend, so that every one can see how many persons have cared to come and visit the grave. Often there is quite a pile of stones; at other graves only a few. The graves of

the women are plain; those of the men have a round stone on top to denote a turban. All graves have a sort of cup or small hole cut into the top of the slab. This cup is supposed to fill up with water when it rains, and the birds of the air come and drink out of it. If they do, it is a visible sign from Allah that the soul of the departed is at peace. It is a good omen to the members of the bereaved household, who go on their way rejoicing.

Tunis is supplied with pure and abundant drinking water piped over 100 kilometers from "Mount Zaghouan," the same springs that supplied Carthage two thousand years ago. Portions of the Roman aqueduct remain and were restored and used by the Spanish during their invasion of northern Africa. The Roman cisterns of Carthage were very numerous and so well preserved that the French government has at last appropriated the best and made them into a reservoir that supplies the surrounding towns of La Marsa, Sidi-bou-Said, La Goulette and others.

Bedouins have utilized the older cisterns, that look like great caverns, and made homes out of them, and their children run after you for miles, begging for coppers.

The Bedouins that cannot find room in these old cisterns, or prefer to roam, build their tents under the shelter of some prickly-pear hedge to break the sharp wind that sweeps over Carthage during the winter months.

The foundation of Carthage dates from the ninth century B. C., under Dido, a Phœnician princess. It was built on and around a hill called the "Byrsa." A large Roman Catholic cathedral, St. Louis of Carthage, occupies the site today, and was built by the "Pères Blancs," or White Fathers, a brotherhood founded by the late Cardinal Lavigerie. Besides doing a great deal of good among the natives, the Pères Blancs have excavated the ruins of Carthage under the supervision of Father Dulatre, one of the greatest authorities on Phœnician and Roman antiquities.

The Roman arena is small. The cross was erected in memory of early Christian martyrs, thrown to wild beasts on this spot 202 A. D. The "Theater of the Odeon" has some fine old capitals and columns lying about, and one can form an idea of its former beauty on going to the Museum of the Bardo, where it seems as if almost every other statue or bas-relief is marked as coming from the Odeon-Carthage.

The two lakes with the island in the center are all that remains of the famous ports of Carthage, where the Phœnician war galleys laid at anchor. The admiral of the fleet and his officers lived in quarters on the little round island, now partly filled in by the shifting sand. From the Byrsa the view spreads over a wide and placid bay of wondrous color, dotted with lateen sails of the fishing craft.

In the distance looms up "Bon-Kornain," or the Mountain of the Bull, where during the centuries the Phœnicians lived at Carthage hundreds of captives, slaves, and children were sacrificed at one time to Baal, Moloch, or Tassit. The two peaks of Bon-Kornain are supposed to have resembled the horns of a bull, and here between the horns was one of those "high altars of Baal" spoken of in the Bible.

# A JOURNEY IN MOROCCO: "THE LAND OF THE MOORS"

By Thomas Lindsey Blayney, Ph.D., Central University of Kentucky

THE expression "Classic land of the Arabian Nights" has been applied to Morocco so often by travelers that it has almost become trite; yet no other phrase seems to the writer to portray so well the life, glamour, and color of this unique land. While other oriental countries—Palestine, Egypt, Algeria, Turkey—have been profoundly modified by external influences, the "Land of the Moors" has preserved almost inviolate the manners, customs, and racial appearance of the East of ancient days. It has withstood with success the blandishments of civilization on the one hand and the threats of cupidity on the other. The traveler in search of novelty may approach its shores with confidence; the student of civilization can be assured of rich reward.

Morocco is about the size of Spain. The high chain of the Atlas Mountains, which to the south separates it from the desert, renders the climate healthful and pleasant. Prof. Theobald Fisher, of the University of Marburg, the best-known scientific student of Moroccan climatology, credits this most western land of Barbary with unusual climatic and physical advantages. These he believes, under proper conditions, will render Morocco an even richer agricultural country than Algeria and Tunisia and even enable it to rival the fertile regions about Malaga and Valencia.

Owing to the fanaticism of the inhabitants, it has not been possible to make any thorough study of the possible mineral wealth of the land, but it is known that gold, silver, copper, antimony, iron, iridium, and palladium are present. The intense antipathy of the inhabitants to foreigners and to foreign ideas has rendered the mineral and agricultural wealth of the country practically useless.

The forbidding, precipitous chain of the Rif Mountains, which forms, along the Mediterranean, the northern confine of Morocco and is the southernmost of the famed "Pillars of Hercules," gives no hint of the rich, rolling land beyond. This northern chain, where "Mauretania's giant shadows frown," and the Atlas range are the Nature-built citadels of the warlike, robbing Berber tribes, the remnants of the original inhabitants of the Barbary States. These Rifian Berbers, fierce but frank, have furnished the sinews of war to conquering African armies from the days of Carthage to the present.

### FIGHTING, A BIRTHRIGHT

The conquerors of Spain were not Saracens (Easterners), but Berbers, among whom at an early date Mohammedanism had been introduced by the Arabs. The very name "Morocco" is a misnomer, derived through the Spanish from the name of one of the capital cities (Spanish, Marueccos; Arabic, Marrakesh; English, Morocco City). The Arabic name of the country is El Moghrib el Aksa, "Most Western Land," but the natives refer to it as "El Gharb."

A large proportion of the population of the valleys and towns is of Arab extraction, though mixed with Berber and negro blood. These Arabs are principally descendants of Arab tribes from the south of Egypt, who overflooded North Africa about the year 1050. This is the only Arabic-speaking part of the population, the Berbers having preserved their primitive, unwritten language. Many of the Moors have a complexion

OUTLINE MAP OF PART OF NORTH AFRICA

BREAD MARKET OUTSIDE THE CITY GATE IN TANGIER

The empty grain baskets are put to practical use. Some of the women can scarcely be distinguished from heaps of rags. Photo by Thomas L. Blayney, Ph. D.

A MOROCCAN CITY GATE

Pedestrians have difficulty in holding their own against the stream of horses, donkeys, camels, and dogs that obstructs the narrow passage. Photo by Thomas L. Blayney, Ph. D.

of a chalklike fairness, betraying the presence of the blood of Gothic mothers, infused at the time of the Moorish ascendancy in Spain. The negro element, slaves from the Sudan or offspring of such, is everywhere in evidence. Those that have been freed, or who are sons of Arabs by negro mothers, enjoy all political and religious privileges of the dominant race. There remain to be mentioned the Jews, despised by all true Moslems, who are compelled to live in separate villages or quarters of the cities (Mellâhs), but who here, as in other oriental lands, form the well-to-do, progressive merchant class.

Phœnicians, Romans, and Vandals in turn have held transitory sway here, but have left no lasting imprint upon the population or customs. Contrary to the accepted opinion, the land was not originally invaded by a Moslem host, who forced their religion upon the inhabitants, but on the other hand was converted to the faith of Islam by peaceful missionaries fleeing from the Kahlifa of Mecca. The new faith spread rapidly among the Berbers of the surrounding tribes, but they always have been, and are today, less strict observers of the laws of the Koran than the Arab population. The coalition of these Mohammedanized Ber-

WOMAN OF MIDDLE CLASS (STANDING) AND SLAVE MOTHER WITH CHILD

Illustrations of similar water jars can be seen on Egyptian ruins. Photo by Thomas L. Blayney, Ph. D.

A MOROCCAN REPAST

"Bah!" say the Arabs. "We don't stick into our mouths what but yesterday was in the mouth of some one else. We put our own hands in our own mouths." Photo by Thomas L. Blayney, Ph. D.

ber tribes began to look for new lands to conquer. From here set out under Tarik (Gibraltar, "Rock of Tarik") the expedition which placed the Crescent above the Cross in Spain, where for more than seven hundred years it waved victoriously.

### THE INFIDEL CITY

It was a bright October day that the writer, with his wife and brother, set out from the frowning rock of Gibraltar to traverse the narrow stretch of water which some convulsion of nature has placed between Europe and Africa. In a little more than two hours' time our small steamer brought us within sight of Tangier, called by the natives in Arabic "dog of a town" on account of the fact that Christians have acquired the right of holding property there; incidentally perhaps because electric lights, a drainage system, cafés, and other outgrowths of civilization are in evidence. From the sea, and to the traveler fresh from Broadway, Pall Mall, or the Champs Elysées, Tangier is the Arab city of North Africa par excellence, for the ugly dashes of yellow, green, and red, with which scattered modern constructions have marred the otherwise glistening whiteness of the native city, are not distinguishable until the steamer lies close in.

It is hard to realize that this peaceful, silent city is the diplomatic capital of a land of almost continual bloodshed. The actual capital cities of the country are Fez, Mequinez, and Morocco City, in each of which the Sultan resides a part of the year. In Tangier, though not

A VILLAGE HOME IN THE INTERIOR OF MOROCCO

Note the stork's nest. The women believe the stork is a bearer of love messages. Photo by Thomas L. Blayney, Ph. D.

officially a capital, reside the accredited representatives of the great powers and the Moroccan minister of foreign affairs. Being a city of "infidels," it has been visited only on rarest occasions by any of the sultans. This arrangement, while being very convenient for the ministers of European nations, is still more suited to the ways of "oriental diplomacy," for long and advantageous delays can be secured by the Moroccan government "while the wishes of His Sharufian Majesty are consulted" in some one of the distant capital cities. Lack of space will prevent me from discussing more than incidentally the government and history of the country, for which I would refer the reader to the excellent article by Mr. Ion Perdicaris in THE NATIONAL GEOGRAPHIC MAGAZINE, March, 1906.

Our party was fortunate in securing apartments overlooking the beach to the south of the city, the hard sand of which makes it an important thoroughfare. Before our windows an entrancing panorama of city, sea, and mountain unfolded itself. To the left the white city, with its minarets; to the right, long stretches of green coastline, terminated by the old fortress at Cape Malabat; in the foreground, quaint Moorish craft, resembling the dahabiyehs of the Nile, whose strange white sails sent them darting across the bay; in the background, across the Strait of Gibraltar, rose the mountains of Andalusia, cutting off from view the storied land beyond.

### NATIVE TYPES IN THE CITY

In the near foreground the white surf on the beach caused the strange procession of figures, that came and went on the sands, to stand out the more boldly. At one moment it was an Arab from a village, fat and content, enveloped in a "bournous," a white—or what was once

MOROCCAN GATE AND GUARDS

In this case the Moorish style shows strong Renaissance leanings. Photo by Thomas L. Blayney, Ph. D.

Photo by George E. Holt

HIGHWAY ALONG BEACH: TANGIER

white—flowing garment with peaked hood. He was seated well toward the tail of the smallest imaginable donkey, and behind trudged two or three of his wives, loaded down with the produce of their lord and master for the market. Next passed a rich Moor from Tetuan, mounted on a gaily caparisoned white mule. As he cantered placidly along his mantle vied in whiteness with the surf, for these "*k'sa*" of the rich are as delicate and gauzelike as the most fastidious woman could wish.

At the next moment passed a group from the country to the south. Their heads were closely shaven, with the exception of a tuft about the size of a dollar a little above and behind the right ear, which falling in a plait about a foot long gave them a very uncanny appearance. They beat along unmercifully their overladen and horribly chafed donkeys, loaded down with country produce, a great part of which is destined for His Britannic Majesty's red-coats at Gibraltar. These men are clad in a single dirty, short mantle of a material resembling potato sacking, which falls considerably short of reaching their coppery knees. The airy costume of their veiled women, of similar material, modestly reached the knee. Now and again an Arab on a high saddle, with shining Moorish stirrups, astride a fiery, slender-limbed horse, came coursing by, his long, creamy garments streaming to the wind, in his hand the six-foot brass or silver mounted rifle, which the Spaniards have learned to their grief to know so well.

The traveler from Europe will be struck at once by the total lack of the well-known rumble of city streets, for though the uneven thoroughfares are in most part paved with cobblestones, wheeled vehicles are practically unknown, not only in Tangier, but throughout the Empire. The streets are nevertheless crowded with other means of transport. So narrow are some of them that at the oft-repeated "*Balak!*" "Look out!" one must again and again spring into some doorway in order to let donkeys, mules, and horses, with their spreading burdens, pass by.

Camels have to be unloaded on the "soko," or market-place, outside the

Photo by George L. Holt

SCENE IN THE MELON MARKET

walls. Things too heavy to be carried by a single animal must be transported by men, and it is no unusual sight to see great stones five and six feet long slung on poles and borne by a dozen or more half-naked Arabs.

In these narrow streets the little box-like shops, waist high, give the proper oriental setting to the whole. In them we see the owner reclining and sedately reading, seemingly oblivious to the stirring scene around him, until he is "disturbed" by a purchaser for his goods, all of which are within arm's reach.

### THE PRISON CONDITIONS

Another of the "sights" of Tangier is the prison. One can pass the guards at the outer gate and, stooping down, peer through a hole at the miserable creatures within. Practically all of them are heavily chained, some having heavy chains even about the neck. They are in every stage of misery and sickness. The government does not feed them, when not forced to do so by the powers, and sad indeed is the state of those who have no money or friends. They weave little baskets, which they sell to visitors, and so manage to keep body and soul together a little longer.

It will be recalled that one of the wrongs alleged against the government by Rasuli, the noted bandit chief, who captured Mr. Perdicaris, was that he had been chained for four years in such a way that he could neither lie nor stand. The slightest pretext suffices to bring a prison fate to high and low, for the grand vizier of today may be the half-naked prisoner of tomorrow. The laws are supposed to be based upon the Koran, and all cases not involving foreigners are decided by the judge, either civil or religious, who sits in the open several times a week and decides at once all cases brought before him. The penalties are fines, imprisonment, whipping, burning out of eyes, chopping off of hands, feet, or head.

Photo by George E. Holt

WHIPPING GATE OF A PRISON: TANGIER

Our party remained in Tangier only long enough to make arrangements for horses, pack animals, men, and supplies. No great amount of the latter is necessary, for the kaids of villages are compelled to furnish what is necessary at a reasonable price. However, the system of quartering passing troops, etc., upon the villages is so oppressive that the inhabitants have withdrawn from the important caravan routes. For this reason, and on account of delays, we might find ourselves compelled to stop near some poor "*douar*," a sort of Bedouin-like roving village, whose inhabitants might not be in the position to supply our needs, when we would, of course, be forced to fall back upon our own resources.

Our guide, Jelalli, was an Algerian Arab, in whose veins flowed some negro blood. He spoke French fairly well, was extremely polite and obliging, and was always well groomed. He was invaluable to us, for aside from being a good organizer his suavity of manner and conversance with people and things Moroccan enabled us to do and see many things otherwise not attainable.

MAKING UP THE CARAVAN

One other member of the caravan who should be mentioned was "Hashmed," the soldier furnished us by the government, without whom the Sultan could not have been held responsible for our safety. Though officially his only concern was to guard us, yet he was always willing to lend a helping hand. During the long days of our Moroccan travels he followed us like a faithful dog, and everywhere his tall figure, erect in spite of the weight of sixty years, and pointed turban of the Sultan's guard commanded instant respect.

As we rode through the crowded streets of Tangier on the day of our departure for the interior, I think we will all confess to having felt a little "queer," as we noticed the glances, half scowling, half curious, of the faces of the throng. In the midst of that motley element the towering form of our soldier, who stood responsible with his head for our safety, seemed slender protection indeed for a lady and two white men in what has been called the most oriental country of the world. My brother and I realized

only too well that few women had ever penetrated into the interior of the country, and that the presence of Mrs. Blayney complicated matters considerably. To the credit of my wife be it said that if she realized the dangers that surrounded her, she preserved the same outward coolness and nerve she has so often shown in trying moments in various parts of the world. As we emerged into the open country and new scenes began to present themselves, our spirits began to return. Now and then we passed squalid villages, with their ever-present dung-heap, on top of which often sat the chief man of the village, as upon a throne, surrounded by his wives, slaves, and others, all wrapt in oriental silence and eyeing us curiously. My wife, being unveiled and upon a European side-saddle, was always the center of attraction.

### THE ARTERIES OF TRAFFIC

The road we were traveling that day deserves description, for, being one of the chief arteries of traffic, what is said of it applies equally well to all other roads of the Empire. It consisted of a series of bridle paths, more or less parallel (generally less), varying from three to a dozen or more in number, according to the nature of the ground. Where the soil is soft, these paths or trails are worn three feet or so deep and are just wide enough to admit the legs of a horse or camel, so that at times the rider must hold up his feet to prevent them from touching the ground. A curious sight it is to stand some distance to one side of a trail of this kind and watch a moving horseman, for he has every appearance of gliding over the plain on a legless steed. There are no cuttings, no bridges.

Not wishing to make a long stage that first day, our caravan had received orders to await us at the first low range of hills to the south. Just before sunset we found our tents pitched and tea and cakes awaiting us. Having refreshed ourselves and taking one of our muleteers as a guard, we climbed to the top of a high, rocky hill dominating the plain and lower foothills toward Tangier.

Photo by George E. Holt

A "HURDY-GURDY" IN TANGIER

Pastoral indeed was the scene at our feet. To the right wound a little sparkling river across the green plain, on the banks of which grazed cattle and sheep. Near the foot of the hill stretched a rambling village, the thatched roofs of the huts giving a dash of dark brown to the green of the plain. Here and there a Moorish doorway of horseshoe form stood out at that late hour like a black geometrical figure on the white walls. Just outside the village lay our camp, the tents glistening white in the last rays of

Photo by George E. Holt

A MERCHANT EN ROUTE

the sun, while in and out among them moved the picturesque figures of our Arabs. The pale smoke curling lazily upward indicated that Hamed, our chef, was scolding away among the pots and pans of his kitchen tent. Near our camp a caravan of some twenty camels was being relieved of their loads. In the distance sparkled the Atlantic, to which we must now bid farewell.

Close to us an Arab lad, reclining motionless on a ledge of rock, was regarding us fixedly. So still was he that we had not been aware of his presence. Farther down the hill on a projecting rock the tall, white figure of our soldier could be seen. At one moment he would stand erect, with his face toward Mecca; at the next he would sink slowly upon his knees and kiss the bare rock, all with indescribable grace of movement. He was praying, for the sun was sinking to rest. The distant range of hills to the north hid from view the last outpost of civilization, Tangier by the sea. Above all played the glorious colors of that African sunset, transforming the whole into a fairy scene.

### THE FIRST NIGHT'S CAMP

Returning to our camp, we found dinner awaiting us, consisting, as it always did afterward, of seven courses—a soup, two meats, a vegetable, salad, dessert, fruits, and nuts. When near a river we usually had a fish, which increased our menu by one course. Our evenings were usually spent lounging in comfortable camp chairs, sipping our coffee and discussing the events of the day. Sometimes we would call Jelalli in and have him entertain us with descriptions of life in Algeria and Morocco. Near, or in, the important towns the "kaids," with a number of their chief men, would visit us, and many a pleasant hour was passed in conversing with them, with Jelalli as interpreter.

At about 10 o'clock of the second day we began to ascend the "Red Mountains," so called partly on account of the color of the soil and partly, we were told, by reason of the amount of blood that has been shed here. On approaching these mountains we could not, as usual, ride with Jelalli and the soldier ahead of our caravan, but were compelled to keep together for mutual protection. No caravan dares pass here after nightfall, for it would be most certainly set upon. Near the summit we passed a band of wild-looking men, armed with the long Moroccan rifles, who are stationed here by the Pasha for the protection of travelers, but who, according to Jelalli, plunder on their own account when darkness sets in.

We now began passing picturesque caravans of camels, horses, or mules bringing silks, fruits, eggs, chickens, etc., from the interior. The chickens were transported in what looked like long barrels without tops or bottoms, slung on either side of the animal, the ends being closed by netting. When one of the caravans stopped, the almost barren plain presented a strange appearance, dotted over with these barrels, each surrounded by its hungry flock of feeding chickens, which showed no inclination to desert their own barrel.

Whenever a caravan of camels camped near us, we could not resist visiting it in order to fathom, if possible, the mystery of this strange animal's ability to placidly devour the cactus plants, with which the whole country is covered. These plants have thorns on them as strong and sharp as large needles and will easily pierce shoe leather, and yet these beasts will bite off a great thorn-covered piece of one of these terrible plants and chew it as sedately as though it were but bran. The operation over, I always felt like taking off my hat to the "ship of the desert."

Photo by George E. Holt

A CANDY SELLER

Just before sunset on the third day we came in sight of Alcazar, nestled away among its groves of olives, oranges, and lemons. The whiteness of its houses, gleaming amid the green girdle of verdure, with here and there a minaret or tall palm to break their flatness, was restful to our eyes after a three-days' ride across treeless mountains and plains. Our camp was pitched close to the town, and we soon received an invitation to take tea with one of the more prosperous citizens. Our host tasted each cup of tea before passing it to us. Arab etiquette also compels one to make as much noise as possible in sipping the tea, so that our party soon sounded like several horses trying to drink in too shallow water. Here also we were treated (?) to butter, said to be ten years' old, but we agreed that it tasted a thousand. On the next day we received as a present a great steaming bowl of "kous-kous," one of the best known as well as best tasting Arab dishes. It is composed of pieces

Photo by George E. Holt

VARIED TYPES: MOROCCO

of chicken buried in a great heap of barley meal, raisins, and spices and cooked by steaming.

HONORING A GUEST,—THE POWDER PLAY

Here also was instituted a "powder play" in our honor. A number of Moors in flowing garments and mounted on handsome horses formed in line at some distance from our camp. Placing the reins about their own necks in order to have their hands free to handle their long guns, they started toward our tents in a slow canter. After going some fifty yards, at a given signal they dashed forward at full speed, twirling their guns about their bodies and over their heads, then pitching them into the air and catching them again. Arriving immediately in front of us, they discharged their guns and reined in their steeds so suddenly that the horses fairly slid over the ground on their haunches in their efforts to check their mad career. They would then return in a sedate walk to the starting point and repeat the "play." We remained two nights at Alcazar in order to have some necessary repairs to our outfit made.

After leaving this rather unimportant town, the country became wild and hilly and quite unsafe. The guards, from six to ten in number, whom the kaid of each village or town had been compelled to place about our camp and who had seemed so useless, were from now on appreciated.

The second night after leaving Alcazar our camp was thrown into a state of turmoil. We were preparing to retire for the night when the evening stillness was rudely broken by most unearthly yells and sounds of blows close at hand. Thinking that at last the bandits were upon us, we snatched up our revolvers, but before the tents could be unbuttoned the sounds began to die away in the distance.

Tragedy was turned into comedy. It seemed that the chief of our village guards of that night on making his round had found one of his men lying on his face asleep. Seizing the convenient opportunity for chastisement, he "lit in" with a club and landed several well-directed blows before the luckless son of Morocco, emitting lusty howls of pain, could get to his feet and seek his more inviting home.

We were beginning to feel that the stories about the lawless condition of the country had been grossly exaggerated, when upon the night following the one just mentioned we heard distant shoot-

Photo by George E. Holt

A STREET SCENE: TANGIER

ing. The next morning we learned that a "little" raid had been made by one village upon another, in the course of which eight men had been killed and fifteen wounded.

PRIMITIVE AGRICULTURAL METHODS

In the region through which we were now passing we had ample opportunity to observe the primitive agricultural methods. The implements are what they were a thousand years ago. The seed is sown before the soil is touched. It is then turned shallowly into the ground with a plow made entirely of wood with the exception of a piece of metal about four inches long on the point. Though this plow does little more than scratch the surface of the earth, yet so rich is the soil that the harvests are quite good.

On one occasion we saw a horse, a donkey, and the plowman's wife or female slave (the distinction in the country is often quite fine) hitched before the plow. To all appearances the team pulled well together.

As one observes these agricultural scenes from a little distance, the sower slowly scattering the seed, and the plowman clad in short shirt, which leaves his bronzed legs and arms completely bare, following the primitive plow behind his oxen, one is strongly reminded of the scenes depicted on Egyptian ruins. The women at the wells by the wayside, with huge water jars upon their heads, or working the soil with infants astride their backs, securely bound on by a cloth which completely covers them when the sun is warm, or men entirely naked with the exception of a cloth about the loins, washing clothes upon slabs of stone by treading upon the articles with their feet—these and many other scenes too numerous to mention carry the mind back nearly two thousand years to a succession of biblical pictures.

On the fifth and sixth days of our journey we were passing over low mountains, traversing almost treeless plains and plateaux, and fording rivers, some of them so deep that we had to hold our feet up

A CARAVAN ARRIVING AT TANGIER FROM THE INTERIOR

Note the shaven head of the central figure. The single tuft of hair is turned from the spectator. Photo by Thomas L. Blayney, Ph. D.

as high as possible to keep them out of the water. The scene at some of these fords, when various caravans were crossing, was always interesting and sometimes very amusing. In arranging their attire for a deep ford, the country women seemed to adopt the philosophy of the ostrich, for they appeared to deem themselves sufficiently and modestly protected from gaze so long as their faces were carefully covered.

Just before reaching the mountains to the north of Fez we crossed the most barren plain that we encountered on the journey. From early morning till late in the evening we toiled on, looking in vain for a little water to give our famished animals. Although it was nearly the first of November, the African sun had lost none of its strength, and in spite of our cork helmets all three of us were nearly overcome by the broiling heat. Hour after hour we rode on, hoping to find at least a cactus plant to afford us a slight bit of protection, where we could choke down a bite of lunch; but there was no sign of vegetation more than a hand high. A chafed horse caused us delay, and it was not till the middle of the afternoon that we reached the dry bed of a stream, under the banks of which we could crouch in a few feet of shade and attempt to strengthen ourselves with a little food. To make matters worse, when our caravan arrived we found our great jar of boiled water empty, the excuse being that "it had slipped off the mule's back and been spilled." We had our own opinion, however, as to where it had gone. But as we watched our muleteers trudging along on foot, urging on the unwilling animals, we could not begrudge them the water in spite of our own parched throats. To avoid fevers we were compelled to be very careful about our own

SALLY PORT OF OLD FORTRESS Photo by George E. Holt

Note storks on ramparts.

supply of boiled water, but our Arabs would often drop down by the first best fetid puddle, little better than a hog wallow.

As toward nightfall we neared the last mountains separating us from Fez, how refreshing looked the white villages high up on the mountain sides, half hidden in olive groves! These were the villages of the wild Berber tribes, who make frequent raids into the plains and are almost continually at war with the Sultan. They were the first villages we had seen built substantially of stone. As we gazed up at these bandit aeries, perched high among the fastnesses of the mountains, and later had occasion to look into the fearless faces of these men of the mountains, whose ancestors had once reclined in the gilded halls of Andalusia, we could begin to appreciate the seriousness of the proposition that confronts any Sultan of Morocco when compelled to deal with this hardy, primitive race.

On the morning of the eighth day out from Tangier we began to descend the slopes into the great and fertile plain, "El Gharb" (the name of which is applied by the natives to the whole of Morocco). Through this extensive plain flows the largest river of the Empire, the Sebou, and in it are situated two of the three official capitals, sacred Fez and once splendid Mequinez. We had descended into the plain at about 3 o'clock in the afternoon, before we first caught sight of the minarets of the great city, and not till about 5 o'clock did we reach the massive walls. In order to enter the city we had to pass along the frowning, embattled walls of the Sultan's palace and harem, which conceal the houses of the city from view and give the place the forbidding aspect of a city of the Middle Ages. As we passed under the great frowning arch of the Moorish city gateway, in the midst of a wild-looking throng, out of which many dark glances were directed toward us, the full realization came over our party that "infidel dogs," we were entering one of the sacred cities of the Moslem world.

PROSPEROUS NATIVES OF TANGIER Photo by George E. Holt

A CITY OF ARABIAN NIGHTS

We had no sooner passed the several gates of the city walls than we seemed to have been transported, as if by enchantment, back a thousand years into the storied world of Harun-al-Rashid; for, by a fortunate accident, just as we passed a great horseshoe archway, giving access to a walled inclosure, it framed a strange scene. A Moorish wedding was being celebrated. Animated groups of white-robed men were engaged in dancing and firing their long guns, while a company of Arab musicians brought forth startling tones from flutes and drums.

It took us nearly an hour to reach the house that had been put at our disposition, for the streets are so narrow that circulation is difficult. So badly paved and uneven were the streets that our horses slipped badly, and Mrs. Blayney was finally compelled to dismount. We were forced to go in Indian file, the old soldier holding her by the wrist close to his horse's side, for, being still unveiled, she was the object of many a scowling glance. My brother and I brought up the rear in order to keep her in full view. At one moment we thought she was being attacked, for two savage-looking men quite close to her had each other by the throat, but, fortunately, they were only settling a private difficulty.

We were very fortunate in securing an attractive house during our stay in Fez. It lay in the midst of a large garden, in which almost every imaginable kind of fruit grew semi-wild. Our dining-room was a commodious veranda, paved with mosaic and inclosed by Moorish columns and arches. Just in front of the veranda a crystal pool, into which the water tumbled joyously, cooled the air by day and lulled us to sleep by night. A mosaic walk around the fountain was shaded by orange and lemon trees bearing golden fruit. The rooms were paved with brilliant mosaics and the walls decorated with bright tiles. The beds were alcoves, some three feet above the floor and ornamented with mosaic work and tiles, on which a single mattress was laid.

How romantic were those moon-lit evenings on the veranda, as we watched the play of shadows among the trees and listened to the music of the splashing waters, while Mohammed in his white robes glided back and forth serving us

tea and cakes! No less graven in our memory are the hours spent on the flat roof, with the great, mysterious, silent city stretching white out into the moonlight, the foliage of slender, nodding palms only serving to make the graceful outlines of the minarets stand out the more boldly upon the dark shadows of the mountains. Fairyland in the midst of barbarism! For many are the stories that could be told, did but space permit, to illustrate existing conditions.

Photo by George E. Holt

STREET IN A MOORISH TOWN

### THE ANCIENT GLORY OF FEZ

The golden days of Fez began in the ninth century and continued till about the thirteenth. It was then celebrated as a paradise. Around the city were splendid gardens of rarest fruits. The soil, watered by a thousand streams, was of extraordinary fertility. Its numerous schools and libraries and its famous university attracted students even from Europe. The climate, its fruits and flowers, its fountains and wells, its verdure and beauty, caused the city to enjoy a reputation unique in Islan. Its glories have departed, but it still boasts one of the most sacred mosques of the Mohammedan world, that of Mulai Idress, "the Younger," the founder of the kingdom. We were not permitted to even pass through the streets near this famous mosque, nor could we as "infidel dogs" set foot in any of the mosques of Morocco on pain of death.

The sights of Fez are its teeming streets, bazars, and markets. Weeks can be spent in this interesting city and yet new and strange scenes be met with at almost any moment. Snake-charmers, medicine-men, story-tellers with their gaping crowds, slave markets, artisans, and tradesmen of every description, costumes from the four quarters of Morocco and beyond interest the traveler at every turn.

But all is not poetry in Fez. Revolting are the horrible diseases to be seen on every hand. Men, women, and children in all stages of suffering, with nose, lips, eyes, and even limbs eaten away. In the narrow streets before some of the mosques we had actually to pick our way on certain days among the disease-covered bodies of those placed there by relatives or friends to beg. So near death's door were some of them that they could only beckon for alms with a finger. At times we saw dead bodies lying there, for those dying in the night are not removed till late the next day.

Such sights seemed bad enough at first, but worse were yet to come, for several times we were compelled to pass through one of the great city gates, over which hung forty-nine bloody, grinning

COURTYARD OF AN INN Photo by George E. Holt

human heads. They had been salted and sent to the city by the Sultan, who had just completed a successful raid against an insurrectionary province, and had been hung up by the Jews, whose duty it is to do such disagreeable jobs. In this connection I might say that Morocco Jews are not permitted to till the soil, nor ride except on a mule, nor cross certain streets; they are heavily taxed; they must dress in black or dark colors and throw their cloak over the right shoulder.

### A MOORISH WEDDING

Soon after our arrival in the city Mrs. Blayney donned Moorish attire. She had the good fortune to be invited to a wedding celebration at the house of the bride. The celebration took place in the court of a handsome house, with a fountain in the center and graceful Moorish colonna on all four sides. This court was filled with a crowd of women in long "haiks," or mantles, the groom and his friends being at another house celebrating his part in the affair. Above the chatter of the women could be heard the mournful strains of flutes and pipes, accompanied by the booming of the great drums. Around the walls of the court under the arches were hung gay Rabat carpets. Dozens of tea glasses hung in racks between the colonnades for the refreshment of the guests. The alcove in which the bride was holding her reception was piled high with beautiful Moorish mattresses and gay cushions embroidered in gold and silver, all presents from the relatives.

High throned on mattresses and cushions in the center of the room sat the bride of thirteen summers. For seven days she must sit thus with downcast eyes, exposed to the admiring gaze of the curious. She was clothed in a costly red silk dress embroidered in white Arabic designs. Her headdress was high in front, of gold-embroidered cloth draped with silks. Her hair, parted in the middle, was pulled down over the ears and fell in long plaits in front of her shoulders. Emeralds and pearls were wound about her forehead and hung down in thick clusters over her wide sleeves to the elbow. Two fat, black slaves were

constantly busied with the arranging of the strings of pearls and with spreading out her silken robes.

The principal guests wore costumes similar to that of the bride. Their faces were painted scarlet, while eyes, under lip, palms of the hands, and fingers up to the first joint were all stained brown. Rings were worn on the thumbs and anklets as well as bracelets. Their feet, dyed the color of fresh iodine, were incased in gaudy slippers. Around their huge waists (a sign of great beauty) they wore heavy-colored belts a foot wide, in some cases studded with jewels. Each was followed by two slaves bearing cushions, upon which they would assist her to place her unwieldly bulk.

On the seventh day the bride is borne in a sort of box to the home of her future husband amid the firing of guns and Arab music. If not pleased with her, the groom has the right to return her to her father within three months, paying again the price originally paid for her.

The residence portion of the city is strikingly unattractive. We could scarcely believe that we were being taken to call on one of the wealthiest Moors of the city, when we stopped one afternoon in a narrow street, barely five feet wide, inclosed by high, prison-like, windowless walls. And yet these walls were the houses themselves. A massive, iron-studded door was opened, and in semi-darkness we were conducted along a tortuous, dingy passage, through several doors, when suddenly we emerged into one of those inner courts which are the masterpieces of oriental architecture, with its mosaics, tiles, fountains, colonnades of light Saracenic arches supporting a second gallery above, all covered with a profusion of colored and gilded arabesques and pendentives.

There is a twofold explanation for the marked contrast between the exterior and interior of Moorish houses. The first is that this court, upon which all the apartments of the house open, is the center of oriental home life and is the only part that is really ever "viewed"; the other is that, in lands where "might makes right" and property is insecure, no man cares to advertise his wealth to any but his most intimate friends.

### THE SOCIAL LADDER

Almost rivaling these inner courts in popularity, especially with the women, the flat roofs of the houses must be mentioned. Here, however, during certain hours the men are never expected to appear, for they are then sacred to the women of the families, who resort to them unveiled to enjoy the cooling breezes from the Atlas Mountains. This is the popular hour for female visiting. The process, however, is not a simple one, since to insure privacy many of the roofs are shut in by a wall from four to six feet high.

In order, therefore, literally to "drop in" on a neighbor, the Moorish lady calls for her ladder instead of her carriage. This mode of calling presents insuperable difficulties to the most "attractive" ladies of Fez, for it must be remembered that the fame for beauty of a Moroccan lady increases in direct proportion to her increase in avoirdupois.

The journey from Fez to Mequinez through the valley of the Sebou can easily be made in two stages. Owing to the proximity of the Berber fastnesses, it is considered quite dangerous, but we were enabled to reach this second capital of the country without mishap. A letter from the Pasha of Tangier procured for us a camping ground in an outer court of the Sultan's palace, completely surrounded by its great crenelated walls and somber gates. A detachment of sixteen men was sent by the Pasha of the city to guard our camp.

It was a fine, clear night, that first night in the once brilliant capital of Mouley Ismael, "the Cruel." The canvas of our tents gleamed white as snow against the dark background of the embattled walls. The dark forms of our tethered horses and mules cut clear in the moonlight. Around our camp sat or reclined the white-robed figures of our guards, the mountings of their long rifles glittering as by day. Now and again

Photo by George E. Holt

MOROCCAN WOMEN OF THE ATLAS MOUNTAIN DISTRICT

their chief arose and silently made a tour of inspection and again seated himself as motionless as the forms of his men.

### MEQUINEZ THE BEAUTIFUL

From out the silence of the night voices of the past seemed to speak. The spirit forms of the great Mouley and his four thousand wives seemed to people the shadows of the frowning walls. It was he who made Mequinez the most beautiful city of Morocco. Here he established his famous and dreaded "Black Guard," whose descendants are everywhere to be seen. Half the city is yet occupied by the remains of his palace, surrounded by immense gardens, in the midst of which stands a kind of fortress, reputed to contain the treasures of the Sultan. In his day slaves guarded this treasure, whose eyes were afterwards burned out or who were walled up in subterranean dungeons, the opening to one of which yawned close to our camp.

Mequinez might be called the monument to Mouley Ismael, the great contemporary of Louis XIV, who even dared sue for the hand of a daughter of the great French king. His mania for building is everywhere in evidence. For miles along the road leading to the quarries to the north great blocks of stone can still be seen lying, just as they fell from the hands of the slaves when they heard that their tyrant sovereign was dead. But a melancholy interest is attached to these great buildings, for it must be remembered that hundreds of Christian slaves toiled and died on these gloomy walls.

The population of the present city has been estimated at about fifty thousand. The streets are wider and more even than those of Fez. The walls of the city are mounted by batteries to repulse the Berber tribes, whose villages on the mountains are a constant menace to the peace of the city. Viewed from the hills to the north, lying on a slight elevation, surrounded by olive groves and little valleys and with the dark mountains in the distant, it offers one of the most charming

THE WALLS OF AN OLD MOORISH FORTRESS

TETUAN: ONE SIDE OF THE GREAT MARKET

Photos by George E. Holt

Photo by George E. Holt

ANCIENT BATTLEMENTS AFFORD SHADE AND A COMFORTABLE RESTING PLACE

panoramas in Morocco. Despite its smiling environment, however, it is reputed to be the most depraved city in morals in the Empire. While at Mequinez we enjoyed several rides in the vicinity with kaids, who seemed glad to give us information about their city and its inhabitants.

THE MOST NORTHERLY SEAPORT

On leaving Mequinez we turned our horses' heads toward Larasche, the most northerly Atlantic seaport of Morocco. The first day's march brought us quite close to the most sacred town of the Empire, Mulai Idrees Zarhon, or simply Zarhon. Here is the sacred shrine of Mulai Idrees, the Elder, the first missionary of Islam to Morocco, buried here in 791. No Christian or Jew dare enter the town.

The whole region is quite unsafe. Of this fact we were thoroughly convinced. We had not been long on the march that day when we overtook and passed a caravan of camels coming from beyond the Atlas Mountains. Soon afterward, among the foothills of the Zarhon Mountains, we passed a group of men strikingly handsome in both face and figure. Jilalli informed us that they were Berbers. Some were standing, others reclining near their handsomely caparisoned Arab steeds. From their animated gesticulations we could see that they were discussing some important question. Jilalli surmised that they were planning a raid of some kind. An hour or so afterward we heard sharp firing from that direction. That night a couple of camel-drivers, belonging to the caravan we had passed, arrived at our camp and related how they had been set upon by Berbers at the point where we had seen the group of horsemen, and that the

caravan had been captured and four of their comrades killed.

A GLIMPSE OF DOMESTIC LIFE

Such incidents lend rather disagreeable zest to Moroccan travel, in spite of the fact that we knew that our caravan offered but slight inducement for an attack. Those inclined to attack us knew that we carried only sufficient money to suffice for the journey from one principal town to another, having orders on Jewish money-lenders in the various towns for any cash needed.

On the night before we reached Larache we had just seated ourselves for dinner when we were startled by a confusion of shrieks, cries, and ejaculations. Rushing out we were confronted by a ludicrous sight. A portly Moroccan gentleman, turbanless and with disordered garments, was sitting astride a confused mass of drapery and of kicking and scratching arms and legs, and dealing with both hands wild but solid blows upon it. On nearer examination the dusky members and piercing cries resolved themselves into three helpmeets, who had seemingly rashly revolted against the scepter of their liege lord. A number of the men of the village looked on in calm indifference for a while and finally pulled the enraged husband off. The eloquent glances cast back at him by his three irate wives, as they betook themselves homeward, did not augur well for his evening meal that night.

There is little to interest the traveler in Larasche. It is a small, poorly built coast town, lacking a good harbor. Did it have the latter it would soon supersede Tangier in importance, as it is much closer to the cities of the interior. We spent but one night there, pressing on toward Tangier. Toward noon on the second day we came in sight of the mountains of Andalusia, on the other side of the Strait of Gibraltar, and soon afterward the blue water of the Bay of Tangier came in view. It was with a feeling of relief, tinged with regret, that we found ourselves once again in civilization, for after the days spent in the heart of Morocco, Tangier, with its narrow streets, its snake-charmers, its bazars and Arab cafés, seemed civilized indeed.

As we bade our men farewell in front of the hotel and patted our horses for the last time, a feeling of sadness came over us. Railroad travel has its advantages, caravan life its discomforts. But let no one judge between them who has not felt, day after day, the exhilaration of breathing in the bracing air of sunrise in the saddle, anticipating a day sure to be filled with strange, new scenes, or who has not experienced the keen pleasure of cantering toward an inviting camp when the setting sun is throwing fairy tints on earth and sky; or who has not tasted the enjoyment, after the evening meal, of giving one's self over to the romance of the Orient while the moon climbs high behind the palms!

For him whose heart is open to the poetry of such a life, who shuns not its risks and discomforts, who desires to understand and appreciate more thoroughly the history of the Moorish ascendancy in Spain, who cares to realize what life was and meant two thousand years ago, for him is awaiting "the Land of the Moors."

WOMEN AND CHILDREN AWAITING THE COMING OF THE DANCERS

Photo by George E. Holt

# THE TWO GREAT MOORISH RELIGIOUS DANCES

By George Edmund Holt

American Vice and Deputy Consul-General, Tangier, Morocco

*With Photographs by the Author*

TWICE each year does Tangier, which is called by the Moors "the Infidel City" and is left off the map of Morocco designed by the follower of the Prophet, lose its right to the charge of infidelity. Twice each year is the tinge of Christianity overcome by the glowing, barbaric colors of Mohammedan fanaticism, and twice each year does the Christian in Tangier feel himself as an insignificant atom in the mass of Moorish life. These two occasions are those of the celebration of the great Mohammedan religious dances, the Aisawa and the Hamadsha.

All the rest of the year, even during the joyful observance of the Moâlood, or birth month of Mohammed the Prophet, when there is much feasting and praying and *fantasia,* the foreigner in Tangier may feel that Mohammedanism and all its followers and possessions are things for his amusement or for his boredom; but when this same foreigner stands for three or four hours or more on the safe balcony of his hotel or watches from his window a hundred white-robed figures, the center of a crowd of thousands of Mohammedans, dancing wildly without cessation; when he hears the interminable beat of the low-voiced drums and the never-ceasing monotony of the shrill pipes; when he sees the banners of the Prophet, malignant green and red and gold, then this Christian foreigner feels that here is something which he cannot understand; that here are people voicing the ideals of the Mohammedan world, which somehow seems to become suddenly larger, and that he himself has had a mistaken conception of what Mohammedanism means. And when his eyes behold the rise and fall of glittering axes upon shaven heads of man and boy, and he hears the peculiar rattle of contact between head and weapon, and sees the beginning of the red flood, which gradually spreads down over face and neck and garments, witnesses the ecstasies of pain in the name of Allah, then somehow the sun seems to become unbearably hot, the air stifling, the shriek of the pipes and the beat of the drums simply infernal, and with it all comes just a faint impression of what fear might be, and the desire to get away from it all to the realities of life, for certainly this mob of dancing, singing demons is not real!

The two annual dances are given by separate sects, which have wide influence not only over Morocco, but over Algeria and Tunisia and eastward as far as Egypt. Tales there are told of the sect of the Aisawa which now, it is said, in interior Tunisia, along the French Sahara, in interior Algeria beyond the French railroads, and in the wilderness of Morocco, is planning a crusade under the red banner which shall drive out the contaminating Christian from Africa. It is claimed by those who have seen much of North African life and have traveled much among the people who have never seen the coast that the Aisawa is a secret organization, now less religious than political; that its members are united with the secret object of raising a *jehad,* or holy war, which will restore to the North Africans their old-time independence and supremacy. Knowing this, the gradually decreasing influence of the annual dance in Tangier becomes a consideration of interest.

Time was when Christians at the time

Photo by George E. Holt

THE AISAWA, SHOWING THE ROWS OF DANCERS

of the dance closed themselves within their houses; at a later date, when the Christian dared to go forth, he was frequently pulled from his horse and maltreated by the population, which had been worked into an anti-Christian frenzy by the religious fervor of the dancers, and at the present time the Christian may pass freely from one spot to another during the dance, provided he is careful not to pass through the throng of dancers themselves. If he were to do this he would undoubtedly, unless help were at hand, meet the death which comes to the dog who tries to pass through the dancing circle and which is torn to pieces by a score of crazy hands.

Gradually, in civilizing Tangier, the frenzy of the dance is being done away with by the unrecognized influence of the Christian. One year a slight control is exerted on one side, the next year upon the other, and this, after many years, has caused it to be safe for the Christian to watch the dance at close quarters.

Coming only once a year and lasting only a few hours, few persons not resident in Tangier or other Moroccan towns see either of these dances. The tourist who is lucky enough to be in Tangier while one of them is in progress goes away with a much different impression of things Moroccan than he who has not seen them, and with cause, for not only is the aspect of the populace entirely changed, not only are the streets and roofs of houses thronged with white-robed and veiled-faced women and by men in brilliant new garments, but there is a thrill in the air—a thrill that causes peculiar little shivers to go up and down the spinal column of the foreigner. Some tourists when they first view the dance are weak enough to be overcome by the thrill and the heat and the strangeness of it all and to faint.

The Aisawa are followers of one M'Hammed Ben Aisa, a saint who lived about two centuries ago, in the reign of the great Mulai Ismail. M'Hammed Ben Aisa was a poor man who knew not the feeling of gold. One evening, returning from prayer, he was met by a very much excited wife, who told him a tale which caused him to run with great haste to his home, and there, sure enough, was confirmation of the peculiar story that she had been jerking out to him during their homeward trip. A jar full of gold she had in some strange manner drawn from the well while trying to draw a jar of water.

Presumably M'Hammed Ben Aisa and his wife spent much of that night lowering the jar into the well and drawing it up again. History does not say whether there was any more gold in the well, but it does say that M'Hammed Ben Aisa got enough sleep to have a vision, in which he was commanded to form a brotherhood in the name of Allah.

Thus was founded the Aisawa brotherhood which gathers at Maknez, the home of their founder, some thirty miles from Fez, where there is a shrine to the saint, M'Hammed Ben Aisa. To attend this gathering members of the brotherhood come there from Algeria, from Tunisia, and less frequently from Egypt. They are supposed to dance most of the way. As a matter of fact they dance only through the larger cities.

They are supposed to eat alive any animal which crosses their path; but this has been gradually modified until it applies only to animals which are more or less edible, and still it is said they eat many things which the ordinary person cannot eat, such as red-hot coals, thorns, and poison, for they are supposed to be immune from the effect of poisons. But at the gathering at Maknez, which is attended by thousands of the brotherhood, there is feasting aplenty, and the sheep which are eaten are numbered by the thousands. After two days of feasting the dancers bid each other farewell until the following year.

The complete possession of the city of Maknez once each year by the followers of M'Hammed Ben Aisa is somewhat interesting, in view of the fact that the old

Photo by George E. Holt

GROUP OF WOMEN DANCING THE AISAWA DANCE

AISAWA DANCERS EATING EARTH Photo by George E. Holt

Sultan, Mulai Ismail, fearing the continually growing power of the brotherhood founded by his contemporary, M'Hammed Ben Aisa, banished that person; whereupon M'Hammed, who apparently had taken no inconsiderable sum from his well, offered to buy the city of Maknez from the Sultan and to pay therefor no small price. The Sultan, thinking that M'Hammed—in American vernacular—was "bluffing", agreed to this, and was much surprised when the saint produced the cash and took possession of the city.

Whereupon the Sultan, with true sultanic powers, refused to abide by the terms of the agreement, as a consequence of which it was agreed between them that from the twelfth to the nineteenth day of *Sefar* only should the members of the Aisawa be allowed on the streets of the city. Whether or not the wise old saint anticipated the result of this it would be hard to say, but it is an historical fact that in order to avoid being shut up in their houses for seven days all the inhabitants of the city joined the Aisawa brotherhood, which was not what the Sultan had anticipated.

Time passed and the saint M'Hammed Ben Aisa was gathered to the smiles of the Prophet. Then the Sultan Mulai Ismail became busy. He prepared a nest of snakes and commanded the Aisawa, who had boasted of their immunity to snake bites and poisons that would kill the average person, to enter the pit and face the reptiles and to eat poison food. Naturally there was at first some hesitation, but finally one Khamisah, a wife of one of the Aisawa, and braver than the rest, sprang into the pit and the rest followed. It is said that they suffered not the least, either from the snake bites or the poisonous food, and also that the woman Khamisah became upon her death Lalla Khamisah, herself a saint.

No one ever knows exactly when the great dance will take place in Tangier. Usually it is definitely set for half a dozen different days before it finally comes, and when it does it is almost

Photo by George E. Holt

"ALL IN": A HAMADSHA WHO HAS OVERWORKED

without preliminary notice. In some peculiar manner a few hours before the appearance of the dancers the word is spread about. On the housetops and balconies and windows overlooking the great market-place, as well as on the slopes of the cemetery and tops of the walls, begin to gather white-robed Moorish women, gaily-dressed children, and stately Moors, with here and there groups of Christians, while the great market-place itself is thronged with thousands of spectators.

Then one may hear in the distance the rumble of drums, the shrill notes of pipes, and finally the crowd at the lower gate breaks apart and the red and green banners of the Aisawa brotherhood pass through. The music becomes louder, having the free air of the soko to swell in, half a dozen pipes shriller than the shrillest bagpipe, three or four drums louder than any drum ever heard on battlefield, shouting, crying, wailing together in an indescribable ecstasy, in which the monotonous repetition of notes seems to focus on one small point all the delirium which uncivilized man has been able to put into his barbaric music.

And then, worked into a frenzy, come the dancers, two lines of white-robed figures rising and falling in regular cadence. For perhaps five minutes they dance in one spot; then they pass on a few feet, never ceasing their dancing. The rhythm of the dance is two short notes and one long one. To the first two notes the dancers, their hands held in front of them, raise themselves on tiptoes; with the third long note they sink on bended knees and raise themselves to their toes again, gradually adding, as the dance continues and the ecstasy increases, a hundred other motions, but never getting away from the rhythm. They may whirl about, they may wave their arms

or dance on one foot, but the rhythm, the one, two, *three*—one, two, *three* is always there.

And after a person has listened to them awhile he catches himself keeping time to the music, maybe at first only with a fan or walking stick; then perhaps one finds the muscles of one's knees stiffening in time to the music, and one may even go so far as to rise on one's toes and fall back again as the beat, beat, beat of the drums and the wail of the pipes sink deeper into one's blood.

The road through the great market-place of Tangier is not over one thousand feet long, and yet so slowly do the dancers move that the time occupied in passing from one gate to the other is sometimes five hours, during all of which time no foreigner, unless he be overcame by the noise or the heat or the barbaric splendor, can take himself away, and as he watches all the peculiar tales of the Aisawa dancers recur to him. Servants, who for three hundred and sixty-four days a year are model servants, not over religious, and apparently more than half European, on the day of the dance feel the resistless call of the faith and surprise their masters by casting aside much of their clothing and throwing themselves into one of the rows of the Aisawa and participating with equal fervor in the religious dance.

One cannot understand how the dancers can live through such a long ecstasy of effort; and yet they do, and when after passing through the upper gates of the market-place they gather in the walled inclosure which they maintain, they eat vast quantities of food and show no effects whatever of their terrible dance of endurance.

The Hamadsha, which is a less numerous and influential religious order, confined more to Morocco, are the followers of Sidi Ali Bel Hamdush, who made his appearance as a saint on the pages of Mohammedan history at a later date than M'Hammed Ben Aisa. Sidi Ali Bel Hamdush founded his brotherhood upon the tenet "Who pardons our past sins will pardon those of the future." This seems to be a somewhat inadequate excuse for the rites of the Hamadsha, who also make a pilgrimage each year to the tomb of their founder and patron saint. This tomb is at Zarhom, a sacred city on the hill near Maknez, a city whose streets have never yet been polluted by the foot of a Christian. Many Christians have tried to go there, but they have never succeeded. It is not the policy of Zarhom to let a Christian enter and then kill him, but to kill him before he enters.

The Hamadsha who dance each year in the sôk at Tangier are not numerous. There are perhaps a dozen adult dancers, which number is increased during the different dances by the addition of certain spectators, who are overcome by religious fervor, among which, unfortunately, are usually a number of boys varying in age from ten to fifteen. And when one considers that the thing which differentiates the Hamadsha dance from the dance of the Aisawa is that the Hamadsha have a pleasant way of chopping their own heads with a small axe shaped like an old-time battle-axe, the introduction of small but impulsive boys into the equation causes the average foreign spectator to have a peculiar feeling in the pit of his stomach.

Some way one feels that if a man from thirty to fifty years old wants to whirl around and chop his head with an axe he is old enough to know what he wants to do, but when after the spectacle has reached a point where the blood and the beat of the sun are beginning to have rather a depressing effect, one sees a small boy rush into the circle of dancers, seize an axe from the hand of a man who should have been dead some time, and with a shout of religious joy bring the sharp edge of that axe down upon his little shaven head—well, one wishes that one could have about a five-minute session with the old gentleman and a good-sized base-ball bat to argue with.

The old dancers either have such thick heads or else have learned so well how to handle the axe that they can draw the

Photo by George E. Holt

THE CHIEF OF THE HAMADSHA

The cuts may be observed on his head, and what seems to be a braid of hair down the back is a stream of blood

maximum of blood with the minimum of pain, but the small boy has not learned that, and therefore the small boy sometimes falls down among the dancers and has to be revived and carried home.

The Hamadsha dancers dance fully as long in the market-place as do the Aisawa, but they are not watched as long by the average European, especially if he be a tourist unused to the weird sights that one may see. The Hamadsha, too, has the weird, shrill, monotonous music, the strangely inscribed red and green banners and fantastic whirling of the dance.

Besides the chopping of heads they also have a dance of the whirling dervish and a peculiar symbolical dance performed by two adult dancers. These two, upon beginning the dance, strip themselves to the waist and then, almost exactly like two pugilists who are simply exhibiting the various curves and passes and strikes without touching each other, they go through their performance.

Each motion is the symbol of some phase of the Mohammedan religion or Hamadsha faith. A certain position on the defensive means, for example, the attitude of a Moslem against the Christian invasion. Another, in which attitude the dancer seems filled with anger and about to strike his opponent, means the attitude of Mohammedanism when it shall finally drive the Christian from its domains.

The symbolism of this dance is also participated in by women, who, although they do not chop their heads, dance with equal fervor. One peculiar symbolical incident of the dance is where one woman dancer and one male dancer throw themselves upon their knees facing each other, and then bend forward until, with the tops of their heads touching, they may dig with their teeth a mouthful of earth. This is symbolical of the creation, when Adam and Eve lived upon the fruits of the earth and of the necessity of all their descendants to do the same. There are a thousand similar things of which the Christian may seek in vain for an explanation, and it is only the most apparent and most spectacular which are noticed.

It is like awaking from a nightmare to hear the cry of the pipes die away through the upper gate, to have one's senses released from the thrall of the music, and to lose in the gray mist of evening the sight of the bold covered figures, whirling, dancing, singing, shouting, begging; and one turns back to the things of life wondering that such a thing as this may take place within sound of the guns of Gibraltar.

## RECENT POPULATION FIGURES

By Henry Gannett

IN the same year that we were counting noses, 1910, a number of other nations were doing the same, and the results of many of these counts have been made public. In addition, the population of the United Kingdom, which was enumerated early in the present year, has just been published.

The population of the countries follows, with the rates of increase in the preceding decade:

| | Population | % Increase |
|---|---|---|
| United Kingdom | 45,216,665 | 8 |
| England and Wales | 36,075,269 | 11 |
| Scotland | 4,759,445 | 6 |
| Ireland | 4,381,951 | 2 loss |
| Germany | 64,903,423 | 15 |
| Austria | 28,567,898 | 9 |
| Hungary | 20,850,700 | 8 |
| Spain | 19,503,098 | 5 |
| Norway | 2,392,698 | 7 |
| Sweden | 5,476,441 | 7 |
| Netherlands | 5,898,429 | 15 |
| Switzerland | 3,741,971 | 13 |
| Bulgaria | 4,284,844 | 14 |
| Japan | 50,751,919 | 12 |
| Mexico | 15,063,207 | 11 |

The above countries show rates of increase ranging from 5 per cent, in Spain, up to 15 per cent, in Germany and Netherlands. The corresponding rate of increase in the United States was 21 per cent.

Ireland continued to lose population, as she has done for the past 60 years or more.

The above countries of Europe, ten in

number, contain altogether about 45 per cent of all the people of Europe. Collectively they have increased at the rate of 10 per cent.

France and its colonies and the colonies and dependencies of the United Kingdom take a census during the present year, but the results are not yet available.

## THE FORM OF GLACIER TERMINALS

AS IS well known, the lower ends or terminals of glaciers differ greatly in form, ranging from a gentle slope, through a curve more or less steep, to a sheer cliff.

Glaciers waste in two ways: by ablation; that is, melting and evaporation, and by breaking off in fragments at the terminal, or cleaving. As there is everywhere more or less ablation, the form of the terminal is determined by the presence or absence of this cleaving. If there is no cleaving, the longitudinal profile of the terminal is a curve, more or less steep and convex upward.

All glaciers which project into the sea or other deep water (tidal glaciers) end in cliffs. The main reason for this is well known. The comparatively warm water melts the ice in contact with it, and so undercuts that above, which therefore cleaves off, precisely as a hard bed of rock does when the softer underlying bed is eroded from under it.

Occasionally glaciers ending on land are found with cliff terminals, like those of tidal glaciers, but the method of their construction is quite different.

Such terminals can be formed only when the glacier is moving more rapidly than it melts. Like a river, the movement of the lower part of the glacier is retarded by friction on its bed; the higher parts travel faster and at the lower end project over the lower. Thus unsupported they cleave off, forming a cliff.

Cliff terminals are found on land in moderate latitudes only on glaciers which are advancing. In high northern latitudes, where, owing to the low temperature, melting is at a minimum, such ice fronts are common.

The ordinary form of terminal glaciers ending on land is a curve, convex upward. This form is produced by ablation, coupled with the forward movement of the ice. The more rapid this movement—provided it does not result in an advance of the glacier—the steeper the profile curve of the terminal, and the slower this movement, the flatter the curve. If there is no movement—if the ice at and near the terminal is stagnant—the terminal is a gentle slope.

It follows from the above that the form of the terminal of a glacier may change with the seasons, becoming steeper in winter and less so in summer. It would be interesting to know if this is true. H. G.

## BOOK REVIEWS

"A Tenderfoot with Peary." By George Borup. 8vo., pp. 317; 16 illustrations. New York: Frederick A. Stokes Co. 1911.

It is scarcely necessary to introduce the author as a young Yale graduate who made his maiden trip to the Arctic with Peary on his latest and successful dash to the Pole.

That he was a tenderfoot in the sense that every experience was absolutely new—that, consequently, he saw everything there was to see and felt everything to the full, is plainly written on every page. He was not at all, however, the kind of tenderfoot who never learns, for he became one of Peary's most efficient assistants.

His book is filled with vivid descriptions of scenes and experiences, seen and told as no one but a tenderfoot could. After reading Peary's strong narrative, this book fills in the flesh and blood of the story.

There are few books of travel as captivating as this. The book is beautifully illustrated, mainly from photos taken by the author.

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THE NATIONAL GEOGRAPHIC MAGAZINE

# THE MOLE MEN: AN ACCOUNT OF THE TROGLODYTES OF SOUTHERN TUNISIA

BY FRANK EDWARD JOHNSON

WHEN the cadi's letter reached me in Norwich, Connecticut, early last December, I little realized what I was to see on accepting his kind invitation to come and visit him at Foum Tatahouine, in the extreme southern part of Tunisia. He wrote, "What you have said in your lectures about the Troglodytes is very true and interesting, but you have not seen the highest types of our mountaineers. I myself own one of these mountain caves, and my pleasure is great when I can flee away from the noise and complaints of my tribunal and seek the quiet of my Troglodyte home, which is warm in winter and cool in summer."

The cadi and I had become firm friends during a trip to Tripoli, of Barbary, in the spring of 1910. The boundary between Tripoli and Tunisia was being settled, and the cadi was one of the commissioners sent by the French government. He is a full-blooded Troglodyte.

In certain parts of Tripoli Jews dwell in caves and holes in the earth, but they are not the original Troglodytes and do not date back many centuries.

In the island of Grand Canary there are colonies of cave-dwellers living in caves dug in the cliffs; they are descendants of the Guanchos, and they are fierce and curious. I rode out on horseback to see them. Again, in France and Spain there are people that live in caves. To my great surprise I found that in Washington, D. C., they call the old families in certain streets cave-dwellers, and they were so charming that it was with great difficulty that I tore myself away to start off on my long journey to Tunisia en route to study the Troglodytes of extreme southern Tunisia.

The steamers of the Compagnie Tonache sail once a week (Fridays) from Tunis for Tripoli, of Barbary, and intermediate ports; so one Friday night about 8 o'clock we steamed slowly down the canal from Tunis to La Goulette and around Cape Bon on the good ship *Djurjura*. My welcome on board was a warm one, for the last time I traveled on that steamer was after the attack on me in the streets of Tripoli, and every one, from the captain down to the cabin boy, was most kind and attentive. The captains of this line are well-read, entertaining men and excellent seamen.

About 6 o'clock Saturday morning we dropped anchor in the quaint little town of Sousse, known as Hadremuntum in the days of Rome. The Arab town is well worth a visit, and so are the cata-

Photo by Marie Helms

SCENES FROM THE WEEKLY FAIR IN A SMALL VILLAGE: TUNISIA

Photo by Marie Helms

ARABIAN TYPES: TUNISIA

Photo by Marie Helms

BEDOUINS COMING TO THE WEEKLY FAIR

Photo by Marie Helms

BREAD-SELLERS: TUNISIA

Photo by Marie Helms

AT THE POTTERY-MAKER'S: KNEADING THE CLAY BY TREADING UPON IT

combs and the small but interesting museum of Roman and Phœnician antiquities—mosaics, lamps, pottery, and coins.

One o'clock comes all too soon, and the *Djurjura* sails on the minute. Just before sunset we come into Mahdia, where the wonderful Greek bronzes were fished out of the Mediterranean after remaining hidden for over 2,000 years.

### THE PORT OF OLIVES

After sending ashore some mail and unloading a few tons of cargo, we proceed and enter the harbor of Sfax about 9 a. m. Sunday. Sfax is a hustling little town with a lot of business. It is the center of the cultivation of olives for olive oil and the port for shipping phosphates from the mines above Gafsa, and quantities of esparto-grass are shipped from here to England to be made into paper. Great caravans of camels arrive almost daily loaded with bundles of esparto-grass weighing about 300 kilograms each.

The great olive orchards—forests, one might say—are worth driving or motoring out to see at Toual-el-Cheridi, and the government sponge fisheries are worthy of an article to themselves.

Here in the clear, shallow water of the Mediterranean, about a kilometer outside the harbor of Sfax, is situated a small biological laboratory for the scientific study of sponges. It is unique in the world. Here they watch the development from the tiny larva, so small that it can only be studied under a microscope, until five years later it has developed into a perfect sponge—a sponge that in the markets of the world fetches the highest price. They do not tear and are fine. Diseases of the sponge are studied and records of each sponge kept on file. Of the Greek sponge fisheries and divers we must pass over. Only be sure and take a walk through the Arab town and see the souks. They are smaller than those of Tunis, but the Oriental mass of color cannot be described.

Gabes is a small French town with three large oases of superb palm trees and fertile gardens. Landing in small boats from the steamer is not easy when the sea is rough.

Photo by Marie Helms

THE POTTERY WHICH IS THE MAIN INDUSTRY OF NABEUL, A SMALL ARABIAN TOWN ON CAPE BON, A THREE-HOUR RAILWAY JOURNEY FROM TUNIS

Gabes is a garrison town, and the "Bataillon d'Afrique" is stationed here. Any soldier having served a term in prison twice, for theft, fighting, desertion, or such causes, is sent, after serving his sentence in prison, to finish his military service at Gabes.

One cannot think of Gabes without Marius, the fat, jolly hotel keeper, a true provincial of southern France, and his good wife, Madame Marie. They have lived at Gabes 26 years and know all about the country. "L'ami Marius" is a character known all over Europe; also

Photo by Marie Helms

ARABIAN BOYS OF TUNISIA

Photo by Marie Helms

A HANDSOME ARABIAN BOY: TUNISIA

Photo by Genet

LANDING FROM THE STEAMER AT GABES IN ROUGH WEATHER

his wit, table, and hospitality. Fortunate is the traveler that falls into his good graces.

### THE CAVE CITY

Imagine arriving at a town of 5,000 inhabitants and not seeing one house—only a picturesque mosque, built since the French occupation. Matmata is the chief town of the caidship of Matmata, which covers quite a large area and comprises the villages of Tamezred, Zeraona, Benioussa, Toudjane, Benizelten, and Hadidji. All told there are about 20,000 souls living in this district, which is situated 45 kilometers south of Gabes. All of them are Troglodytes.

At Matmata, Benioussa, Benizelten, and Hadidji the inhabitants live in caves dug in the earth (see pages 812 and 813).

The holes vary in depth and width, but average 9 meters deep by 15 meters in circumference. This great hole, shown on page 818, is used as a "patio," or courtyard. Numerous caves dug in the sides of the hole serve as living-rooms and storehouses. One enters these dwellings by means of a passage tunneled through the earth or rock. Some of the ceilings are roughly ornamented with Arabic designs cut in bas-relief in the rock and the dates when the dwellings were dug. None of them seem to go back more than 100 years and many are not as old, proving my statement that all Troglodytes were originally "climbing Troglodytes," dwelling in caves on the tops of the highest mountain peaks.

Walking through the passage into the large circular courtyard open to the sky, one sees large caves cut into the walls of the tunnel that serve for storehouses and granaries. (Grain will keep here for years in perfect condition.) There are also caves for the goats, sheep, and donkeys. A square masonry trough pipes the rain water into a large cistern built in the center of the courtyard. It rains very little, but when it rains it pours, and every drop of water is carefully preserved—so carefully that horses and ani-

Photo by Genet

RACING CAMEL FROM GHADAMES: IT STANDS ABOUT 3 METERS (9.84 FEET) HIGH

mals are watered only once in every 24 hours, and then not all they want.

The inhabitants of Matmata cultivate olive trees. There are 60,000 trees in the district, but the oil is rather a poor quality, owing to the crude method of making it.

On the drive from Gabes to Matmata we passed fields of barley and some wheat, the ears of which turn black when ripe. There is no wood except the olive trees, and the inhabitants of all this part of the country use dried camel dung for fuel.

### THE LORD OF THE DISTRICT

The Caid of Matmata is a very intelligent Arab, who had been caid at Matmata for about one month. For years he had been caliph at Zarzis, a pretty little French town on the coast, and the change to Matmata must have been an unwelcome one in spite of his advancement from caliph to caid. His dwelling was a Matmata Troglodyte hole, the entrance and walls of which were whitewashed, and in some of his cave-rooms he had installed European furniture. The description of one dwelling answers for all; so let us take that of Sheik Ferdjani, of the tribe of Achéches. His home is a large and typical one (see pictures, pages 817, 818, 819).

### THE HOME OF A SHEIK

Matmata has a special code of etiquette. Never approach near enough to another man's dwelling to look down into the great circular courtyard and see his women. It is not only bad form, but it is dangerous. Each dwelling has numbers of white Kabyle dogs that keep a constant watch, and on your approach would fly at you and like to tear you into pieces. Never enter a passageway to a dwelling without sending in a small boy or girl to let the women know that you are coming.

Sheik Ferdjani asks us to enter. A young man burns a handful of dried esparto-grass, which flames up brightly and shows us the steps and turns down the tunnel. I almost fell over a donkey eating its hay. Great eyes glared at me from out of the blackness. On coming into the large, round courtyard one

Photo by Lehnert & Landrock

CUTTING UP CAMEL MEAT

would think the sheik the father of at least 12 infants, for children from two to 10 years old are curiously watching us. They are very fond of bonbons and sous. Whatever money one gives to the sheik is divided among the children. A beautiful bright-eyed girl of six is the daughter of the sheik, and she likes to

Photo by Lehnert & Landrock

CARDS, THE UNIVERSAL PASTIME

Notice the difference between the southern burnous and that of Tunis. The former shows traces of a Roman toga

Photo by Lehnert & Landrock

CAMELS ABOUT TO FILL THEIR RESERVOIRS: NOTE THE HEN ON THE CAMEL'S BACK

Photo by Lehnert & Landrock

THE APPROACHES TO GABES HAVE A BIBLICAL ATMOSPHERE

Were it not for this water no oasis could exist at Gabes. A very little water makes a tropical oasis, a veritable Garden of Eden

Photo by Lehnert & Landrock

A SCIENTIFIC GAME OF DOMINOES: GABES

DAILY MARKET AT NATIVE VILLAGE OF GABES

Photo by Lehnert & Landrock

AFTER MARKET: TELLING A STORY FROM "THE ARABIAN NIGHTS"

Photo by Lehnert & Landrock

Photo by Lehnert & Landrock

A MAN FROM THE SAHARA, WHO HAS COME TO TRADE AT THE MARKET OF FOUM TATAHOUINE

Photo by Lehnert & Landrock

A NOMAD WOMAN AND HER CHILD

Photo by Lehnert & Landrock

NATIVE WOMEN PREPARING THE NATIONAL ARAB DISH OF COUS-COUS (SEE PAGE 843)

Photo by Lehnert & Landrock

STREET SCENE NEAR GABES

be photographed with her great chum, Aïescha, and her small brothers.

Pushing open a door made of palm-tree boards, we entered the sheik's cave. (It took one hour and a half to take the photograph printed on page 806.) The cave was white-washed. To the left is a wooden chest and a gun, one of many. Back of the gun is a stand cut out of the rock, and the dark object is an oil lamp—the form dating back to the Greek and Roman days. The white object in the center is a bedstead cut out of the rock, and there are comfortable mattresses filled with wool, and native blankets or rugs. Above the bedstead is a sort of cupboard, where one can put snuff, matches or anything one likes.

To the right are large oil and water jars. At the back of the cave are couscous covers, the largest one having come from Ghadames. These covers and couscous plates are highly prized and very ornamental. Above the plates and covers is a Persian picture and an Arab almanac. When Mohammed had to flee from Mecca, 622 A. D., that date became the first year of the Mohammedan calendar, and is called "Hegiré."

### THE WOMAN'S STATUS IN THE HOUSEHOLD

The wives of the sheik live in a cave similar to this next to it, and so do the sons and their wives and children. The question of rent is not of great importance. When a youth is strong enough to carry a gun and take care of some sheep or goats, or manage a few camels, he takes to himself a young wife.

When a man marries he has to give to the parents of his future bride a gift. These gifts may vary according to the tribe and country. In the mountain ranges around Foum Tatahouine and the Troglodyte villages and towns he gives four goats and two kids, four

Photo by Lehnert & Landrock

A NOMAD GIRL, NEAR GABES

sheep and two lambs, 20 liters of olive oil, 60 liters of barley and 40 of wheat, and all over southern Tunisia the fiancé has to give his future father-in-law a new fez cap and slippers, usually of yellow leather, made in Tunis. In some districts a silk haik is given to the mother of the girl. A dot of 30 piasters, equal to 18 francs ($3.00), is given; half the day of the marriage, the balance sometimes a year afterward.

These gifts are for a physically perfect girl. A poor man, not having so much money to buy gifts, can secure a wife blind in one eye, but otherwise sound, for a gift of less value.

In certain tribes the form of abduction takes place. The marriage and the value of presents is arranged between the families by a mutual friend. The bridegroom and his chums (this is the land of friendships like David and Jonathan) make up a small but warlike party, fully armed, and about midnight they stealthily approach the village tent or cave of his beloved, who is waiting. He puts her up behind him on his full-blooded Arab stallion and away they speed. Wails, lamentations, and gun shots come from the home of the girl. She is taken at once to the home of the mutual friend, who has arranged the marriage, and handed over to the care of the women.

In the morning a warlike party of men, fully armed, ride up and demand the release of the abducted girl. After a talk a feast is prepared and the gifts are taken to the home of the bride-to-be and the wedding takes place.

A knock on the door, and "Monsieur est il pret" were the words I heard one

NATIVE WOMEN WASHING IN STREAM NEAR GABES

Photo by Lehnert & Landrock

Photo by Lehnert & Landrock

PALM TREES OF THE SOUTH

Photo by Lehnert & Landrock

NATIVE ARAB TOWN NEAR GABES

ARAB CEMETERY OF EXTREME SOUTHERN TUNISIA

Photo by Lehnert & Landrock

Photo by Lehnert & Landrock

A MAN OF EXTREME SOUTHERN TUNISIA: HE LOOKS LIKE BEN SAADA'S TWIN BROTHER

Photo by Huger

HOUALA MOUNTAIN RANGES AND TOWN OF MATMATA, SHOWING THE HOLES IN THE EARTH IN WHICH THE PEOPLE LIVE

Photo by Huger

GENERAL VIEW OF MATMATA, A TOWN OF 5,000 INHABITANTS, WITHOUT ONE HOUSE

The holes in the ground, forming the entrances to their subterranean houses, may be seen (see page 793)

Photo by Huger

A MILITARY BORDJ AT MATMATA, SHOWING "KALAA," WHERE TROGLODYTES USED TO LIVE
The town of Matmata lies in the valley at the left

Photo by Frank Edward Johnson

INTERIOR OF A JEWISH TROGLODYTE SCHOOL IN A TROGLODYTE CAVE: MATMATA

morning at 3:30 as I was boiling some coffee in my spirit-lamp before starting for Médenine. About 10:30 the evening before word had been brought that there was a place for me in the motor of the military commandant and intendant of Gabes, who were going for an inspection of Médenine. I gladly accepted this offer, as the 78 kilometers took eight hours in a stage-coach, and I wanted to push on to Foum Tatahouine. At such an early hour not a soul was awake, and I had to make the coffee myself or go without until we arrived at Médenine. Day was breaking as my kit-bag was fastened on the footboard of the motor, the air was fresh and bracing, and I was thankful that I had brought my heavy overcoat and steamer rug.

The sun arose in a mass of color and bathed the oasis and surrounding country in a glow of golden pink. We glided out of Gabes and kept up a speed of 30 miles an hour over the excellent road, just finished for the presidential visit of Monsieur Fallières. Last year this road was a so-called "piste," or trail.

The French have done and are doing marvels in northern Africa. One of the first things they do is to make good roads and find water, either by digging wells or by piping from springs in the mountains. Some of the roads in Tunisia were made by the Romans and they were easily converted into excellent macadamized roads, but most of them have been made since the French occupation in 1881. No country offers to the automobilist better roads, more picturesque landscapes, and comfortable little hotels than Tunisia and Algeria. The combined road mileage is over 3,000 miles. The secret of these roads being so good is the remarkable way in which they are kept up.

Large gangs of Sudanese workmen, with French overseers (foremen), water-

TROGLODYTE PATIO, TAKEN FROM THE TOP OF THE GROUND, LOOKING DOWN: A DROP OF 11 METERS FROM TOP TO BOTTOM

LOOKING ACROSS A MATMATA TROGLODYTE PATIO, OR COURTYARD: A GLIMPSE OF THE MINARET

Photos by Frank Edward Johnson

Photo by Frank Edward Johnson

ENTRANCE TO THE CAVE OF SHEIK FERDJANI OF MATMATA

ing carts, and steam rollers are to be seen at frequent intervals. A Sudanese stone-breaker receives one franc per cubic meter of finely broken stone. He sits naked save for a short cotton tunic and an old red fez, and with a small hammer pounds away all day long, singing or crooning to himself a Sudanese love song.

These men in "extreme southern Tunisia" live in "gourbis" on the roadside, and some have their wives and families with them. They are extremely fond of cigarettes, and as I rode past on horseback would frequently ask for one. A cart and mule, with negro or Arab driver, receives 4 francs 50 centimes a day of 10 hours for carting stone. A man that pulls the stones out of the ground receives 1 franc 25 centimes per day. In

Photo by Soler

TROGLODYTE COURTYARD, OR PATIO, OF THE SHEIK OF MATMATA, SHOWING ENTRANCES INTO VARIOUS CAVES

(SEE TEXT, PAGE 793)

Photo by Soler

THE SHEIK'S PRIVATE CAVE: MATMATA

Photo by Frank Edward Johnson

A DAUGHTER OF THE SHEIK OF MATMATA ON THE RIGHT, AND HER CHUM AÏESCHA AND HER BROTHERS

the construction of roads the question of water adds a large item to price per kilometer, and water has to be had in order to roll the road properly.

A road once made requires, in order to be well kept up, for every 30 kilometers one foreman and four workmen, with mules and a watering cart. Then the road can be kept in perfect condition, and if kept up in this way will last from 12 to 15 years, whereas if neglected the road will be worn out in from four to five years.

To build a road in Tunisia costs from 5,000 to 7,500 francs per kilometer. The latter price is considered very expensive. These figures were given me by four contractors, now constructing portions of the road between Médenine and Foum Tatahouine, and verified by the chief officers superintending the construction. All southern Tunisia is under martial law, so that road-building comes under military supervision.

The country between Gabes and Médenine is arid save for small oases of palm trees that dot the landscape. A chain of bluish pink mountains stretches from northwest to southeast, and occasionally we catch a glimpse of dark blue sea off to the left (almost due east). We rush past shepherds watching their large flocks of long black-haired goats or broad-tailed sheep. Caravans of nomads are coming northward for the summer, and we pass their camps of numerous gourbis, tents made of goat and camel hair woven into a strong material; the countless Kabyle dogs bark furiously and the women and girls draw their haiks over their faces so that we may not see them.

Photo by Katrice Nicolson

COURTYARD OF A HOUSE AT MATMATA, SHOWING THE OPENINGS LEADING TO LITTLE CAVES FOR THE ANIMALS

A Bedouin caravan on the march is very picturesque, but annoying when in a motor. The camels take fright, and one must slow down and even stop, for a large camel can effectively block any motor, and it is almost as bad in a cart, carriage, stage-coach, or even on horseback.

When on the march, the women, small children, and babies are placed on the camels, together with their gourbis, tent poles, water jars, and household effects. Older children are astride of donkeys laden with great panniers containing barley and large jars of olive oil. The men are very dark and thin, and each one carries slung over his shoulder a long-barreled flint-lock rifle, with which he is a dangerous shot. Powder costs money, and these nomads are extremely poor. Médenine is the military headquarters of this part of "extreme southern Tunisia."

Telegraph and telephone connect all the garrison towns, and there are regular mail routes by stage-coach, horseback, and by camel. The barracks, government buildings, post-office, and *cercle militaire* form a camp to themselves, and comfortable little villas are being built near by, with broad streets and large squares, with eucalyptus and pepper trees. Last year Médenine seemed almost the ends of the earth, so strange and foreign. On my return from the mountains and my journey to see various Troglodyte towns, Médenine, with its comfortable little hotel, its French cuisine, and clean rooms, with snow-white linen sheets, seemed to me to be civilization.

The Arab town of Médenine lies about half a kilometer away.

Sallust, writing on northern Africa during the period Rome dominated, remarks that he came into a strange country, where "the people dwell in curious abodes that resemble overturned boats cut in two" (see pictures, pages 825-826). This description is equally true after 2,000 years. Centuries come and go;

Photo by Frank Edward Johnson

THE ONLY VEGETABLE GARDEN IN MATMATA, IN FRONT OF THE MOSQUE

The mountain in the background is "La Kalaa," or "fortified citadel," where the people of Matmata used to live when they were "climbing" Troglodytes

great empires like Egypt, Greece, and Rome rise, fall, and vanish; yet back in the mountain ranges of northern Africa are various tribes of "Troglodytes," or cave-dwellers, living today about the same as did their ancestors during the life of Christ, and, if Roman and Greek writers are to be believed, these Troglodytes were then considered a curious and ancient people.

The numerous invasions of northern Africa, especially the Mohammedan and Berber invasions, must have left their impressions, but the chief interest to us is that the invaders were assimilated by the Troglodytes, and that their manner of life and mode of dwelling remained the same until the French occupation of Tunisia. The town, or "ksar," of Médenine consists of thousands of cave-shaped dwellings, made of native cement and stone, superposed upon each other to a height of four or five stories. The Arab name for these curious-shaped dwellings and storehouses is "rhorfa."

One ascends to these granaries or storehouses by means of projecting stones here and there (see page 826), worn smooth by centuries of use. The natives go up and down with great ease, but it would be impossible for one not accustomed to do so. Médenine acts as a high storehouse for about 20,000 people, semi-nomads, living in the great plains, people of the tribes of Ourghamma.

The town has been built in great ovals or horseshoes, each tribe or district to itself to prevent stealing (see photos, pages 804, 805, 825). Armed men guard these precincts.

Metameur is another town built like Médenine. It has a remarkable ksar or storehouse and fortress for use in times of war. The women of Metameur have always been celebrated for their beauty, and it has withstood many sieges.

One good harvest every four years is the average around Médenine, so that the country only raises half enough grain to

sustain the life of its inhabitants. The rest is bought at the markets of Gabes, Zarzis, and Djerba.

On my arrival at Médenine, I went immediately to see about hiring a cart and horse to take me to Foum Tatahouine. Officers at Gabes had given me the address of Monsieur Courtier, a contractor, who usually has a number of spare animals. On going there I found that four of his horses were laid up with sprains or bad cuts and the other two available animals in town were also hurt. Monsieur E. Michal, a French officer of the "Affaires Indigenes" and an old friend of mine, sent word to the Caid of Médenine that I wanted to push on to Foum Tatahouine to visit the cadi, and asked if the caid knew of any horse or mule that I could hire. An answer came back very quickly that "The caid had a very strong fast mule that he would lend me." So after lunch up came the mule and Monsieur Courtier's small two-wheeled cart and Ali, the driver. About 1 o'clock off we started. The landscape had been wild between Gabes and Médenine, but it grew wilder the nearer we approached the curious mountain ranges or table-lands, varying in height from 400 to 750 meters.

Between Médenine and Foum Tatahouine, a distance of 52 kilometers (32½ English miles), not a house or village is to be seen. The government has built a "bordj" at "Bir-El-Ahmeur," which means the "red well," about half way between the two towns.

One finds military bordj at intervals over the country; they are military "caravansaries," where officers, soldiers, and officials can find water and shelter. There are always ample water and one or two large rooms for officers, a room for soldiers taken ill or wounded on the march, a series of watering troughs, and a house or room for the Arab guardian and his family. A high wall of substantial masonry surrounds this military camp, usually built in the form of a square, with a large courtyard in the center. There are loopholes in the walls for shooting and strong gates, so that this miniature fortress could withstand a siege.

Only after riding long distances on horse or camel through arid plains or sandy deserts without shade can one appreciate the sight of a hideously ugly bordj, for somewhere around its four high walls can be found welcome shade, where you can throw yourself down and rest. You will not mind your horse or mule carefully picking its way over your prostrate body, so that it, too, can be in the shade.

Almost before the bordj came in sight horses and mules would prick up their ears and want to push eagerly forward, tired as they were, for the water of the "Red Well" is not brackish, and they can drink their fill. Through nine kilometers of deep sand, where the wheels sank in half way up to the hubs, Ali and I had to walk. We saw curious effects of mirage of mountains, lakes, and green oases, where we knew only sandy deserts existed. A small white maribout glistened away off to the left. It seemed as if we would never get there. Then came a turn and 28 kilometers of excellent macadamized road to Foum Tatahouine.

As we draw nearer, two specks stand out against the white road, which grow into horsemen riding at full speed—the cadi and caliph coming to meet me—the first mounted on a superb dark gray stallion and the other on a white, with its tail, mane, and hoofs stained red with henna. My welcome was a warm one and very sincere. A house had been prepared for my arrival and furnished with European furniture—tables, bureaus, sofas, chairs, looking-glasses, and a modern metal bedstead, mattresses, and native woolen blankets. The house was built of stone, with very thick walls, so as to be cool in summer. It belonged to the cadi and was situated on a hill overlooking the pretty little town of Foum Tatahouine, and was not two minutes' walk from the cadi's own house and his law court. The cadi's full name is Mohammed Es-Seghir-Cadi du Djebel-El-Abiodh, which means "Cadi of the White Mountain" (see picture, page 831).

The mountain back of Tatahouine con-

Photo by Soler

PANORAMA OF THE "KSAR" OF MÉDENINE, TAKEN FROM NEAR THE MILITARY CAMP AND LITTLE FRENCH TOWN NOW GROWING UP: NOMAD GOURBIS AND A YAPPING KABYLE DOG IN THE FOREGROUND

Photo by Soler

GENERAL VIEW OF MÉDENINE, SHOWING HOW RHORFAS WERE BUILT IN THE FORM OF AN OVAL, OR HORSESHOE, TO KEEP OUT THIEVES: EACH SMALL TRIBE TO ITSELF (SEE PAGE 822)

Photo by Soler

KSAR OF MÉDENINE

The "Rhorfas" superposed are used as granaries, storehouses, and dwellings by about 20,000 people. The tribe of "Ourghamma," Caidship of Médenine. (See text, page 822). The only means of access to the upper stories are projecting stones and occasional steps.

Photo by Katrice Nicolson

INHABITANTS OF MÉDENINE CLIMBING INTO THEIR HOMES

tains great quantities of magnesium and stands out white against a range of pinkish mountains; hence its name, Djebel-El-Abiodh (the White Mountain).

After the Bey of Tunis and his prime ministers comes the position of caid. He administers the government, acts as supreme judge, and collects taxes and debts. A caliph represents the caid in districts far away from where the caid resides, but he cannot collect taxes.

A cadi is the head of the religious code. The Koran being the law, the cadi sees that the law is carried out; but it does not mean that he is a priest. He acts as judge in family disputes, in matters of inheritance, in questions of land. He marries and divorces, and above all he acts as peacemaker. Many were the wise judgments I heard during my stay at Foum Tatahouine.

A retired chef from Chinini, who had

Photo by Katrice Nicolson

STREET SCENE IN MÉDENINE

been head cook for the officers' mess for over ten years and had earned enough money to retire and live in comfort and peace, had come down to attend to the commissariat department during my visit. Mohammed Ben Sada was his name, and he loved work and he loved to cook. The greater number of courses the more pleased was Sada; the more friends that dropped in to déjeuner or dinner the broader the smile on Sada's face.

The Troglodyte town of Chinini has a great reputation for first-class cooks. One man was called to Rome, and was chief pastry cook to Pope Leo XIII.

Photos by Marie Helms

WOMEN AT A WELL IN MÉDENINE

WOMEN OF MÉDENINE

Photo by Soler

MARKET AT MÉDENINE: A NEW MARKET-PLACE HAS RECENTLY BEEN FINISHED, AND THE PASSING OF OLD MÉDENINE HAS COMMENCED

Photo by Frank Edward Johnson

MOHAMMED ES SEGHIR, CADI DU DJEBEL-EL-ABIODH, AND HIS LITTLE DAUGHTER, MABRUCKA

Another was employed as cook at the Residence Generale de France during the regency of Monsieur Massicault.

The cadi has adopted his nephew, Mohammed, a youth of about 18, and he has a sweet little daughter about eight years old and three small sons. Courtesy forces me to draw a veil over his family life. I was his guest and, knowing Oriental etiquette, never asked questions about the life within his closed doors.

Foum Tatahouine is situated 52 kilometers south of Médenine, at the base of a picturesque gorge and at the foot of Djebel-El-Abiodh (the White Mountain). It is surrounded by sharp peaks and high table-lands, in which are dug the dwellings and villages of the tribes of Ouderna.

Four large oueds, dry river beds (barrancas in Spanish), traverse the country of Tatahouine. They are dry except during the rainy season, when they are fed by a great number of little oueds, called by the Arabs "chebat." Their banks are fertile, and barley can be grown in the valleys watered by these streams. Enough can be raised to live on in average years, and in good years sufficient can be raised to carry one over one or even two bad years of famine. One good crop in six years is the average around Tatahouine.

Foum Tatahouine was created in order to keep the various tribes and towns at peace; to keep out the hordes of pillagers from Tripoli and the caravans of robbers from Ghadames and the south.

Thirty years ago each village was at war with its neighbor—a war to the death, where man, woman, and child were put to the sword and only the plunder, flocks, and beautiful young girls were carried away. Above all, the Toua-

Photo by Soler

PANORAMA OF FOUM TATAHOUINE

Showing large market-place, built by the French and Souks; also "Poste Optique du Tlalet," where before they had the telegraph they signaled to another "Poste Optique" near Médenine. House of the Cadi in left-hand foreground

Photo by Soler

MARKET-PLACE OF FOUM TATAHOUINE: ALL THESE PEOPLE ARE TROGLODYTES

Photo by Frank Edward Johnson

BROADTAIL SHEEP AT THE MARKET OF FOUM TATAHOUINE

regs were dreaded. Mounted on their fast racing camels (mehari), they would swoop down and carry off everything they could lay their hands upon and vanish into the Sahara.

Today, thanks to the officers of the "Affaires Indigenes," a large market-place has been created not far from the military camp (page 833), and here on Mondays and Thursdays a huge market takes place, where deadly enemies of 30 years ago meet and sell and exchange goats, sheep, wool, grain, barley and wheat, olive oil, and all the necessities of life. Dwellings have sprung up around the market-place, most of them shaped like Rhorfa and inhabited by industrious natives from Douirat and Chinini, some southern Jews, and merchants of pottery from the island of Djerba.

Besides several deep wells, a new well has just been finished, built by the government. It cost all told 1,500 francs, including digging, pumps, and a lot of masonry work, which includes a large cistern, or reservoir.

This well is worked by Arab prisoners walking around and around pushing a capstan, four or five men in a gang; each gang works three hours at a time. From 11 a. m. to 3 p. m., owing to the great heat, the pump is stopped. Afternoons about half past four the women and nomads would come by the hundreds with their great water jars and goat-skin water bottles, and their horses, mules, and donkeys. Other prisoners were made to carry stone for building government buildings. The prisoners were serving time for minor offenses—thefts, fighting, etc.—and their terms of imprisonment varied from three days to one month. They seemed quite happy.

The semi-weekly market at Foum Tatahouine is a large affair; people come from all over the country to buy, sell, and exchange. Caravans come frequently from Ghadames, 466 kilometers

Photo by Frank Edward Johnson

THE TOWN OF SIDI-ABDALLAH BON GELIDA, BETWEEN FOUM TATAHOUINE AND DOUIRAT: WOMEN OF THE VILLAGE PULLING UP WATER

further south, bringing ostrich feathers, red tanned gazelle skins, leather cushions and embroidered slippers, and highly prized whips of rhinoceros hide. It is the great meeting place of the Troglodytes. The large market at Kebli, caidship of Nefzaoua, acts as a bourse and determines the prices over extreme southern Tunisia. A printed paper in Arabic and French gives the prices at Kebli from May 15 to June 15, 1911.

Sheep to be sold (1,000), 15 to 20 francs.
Lambs of this year (5,000), 8 to 12 francs.
Goats (5,000), 10 to 11 francs.
Young kids (5,000), 3 to 5 francs.
Camels (200), 100 to 150 francs.
Melted goat's butter, 1 franc 50 centimes a kilogram.

Prices of meat as I wrote these notes, May 20, 1911:

Spring lamb, one kilogram (equals 2 1/5 pounds), 65 centimes.
Goat, one kilogram, 42 to 45 centimes.
Mutton, one kilogram, 55 centimes.
Chicken, 85 centimes to 1 franc 25 centimes each.
One dozen eggs, 40 centimes.
One kilogram of bread, 40 centimes.
Forty liters of wheat (40 liters being an Arab measure), 11 francs 20 centimes.

Forty liters of barley cost 5 francs 40 centimes. A good mule costs from 300 to 500 francs; a large size cow, weighing from 100 to 120 kilograms, 100 francs; a horse, from 80 to 600 francs. Wool costs about 70 centimes a kilogram; olive oil varies from 75 centimes to 1.40 centimes a liter. Salt, tobacco, gunpowder, playing cards, and matches are monopolies in France and her colonies. In Tunisia salt is sold for 10 francs for 100 kilograms, equal to 225 pounds; table salt, 10 centimes a package of 200 grams; matches, 5 to 10 centimes a box; tobacco, the prices vary according to the quality.*

For game one finds hares, partridges, quail, and wild duck; gazelles and "mon-

*One franc equals 20 cents; 100 centimes make one franc; so 5 centimes is equal to one cent of United States currency. Eight kilometers equal 5 English miles; 1 kilometer 5/8 of a mile; 1 liter equals a trifle over one quart; 1 kilogram equals 2 1/5 pounds.

Photos by Soler

GENERAL VIEW OF THE TROGLODYTE TOWN OF DOUIRAT: "CLIMBING" TROGLODYTES. ARAB CEMETERY AND OLD MARIBOUTS IN FOREGROUND. "IT LOOKS LIKE A BEEHIVE" (SEE TEXT, PAGE 839)

Photo by Soler

ANOTHER VIEW OF THE TROGLODYTE TOWN OF DOUIRAT, SHOWING MOSQUE AND STRONGHOLD, NOW FALLING RAPIDLY INTO DECAY

Photo by Frank Edward Johnson

MOHAMMED ON HIS HORSE, NEAR CHININI: OBSERVE THE ROCK STRATA

flon" (a species of big-horned sheep), hyenas, and jackals. White, yellow, and black scorpions abound; also numerous snakes and vipers, one called "the horned viper" being particularly deadly.

Horses and mules were brought me to select one for my long journeys. I chose a large, strong mule about five years old that had the worst temper imaginable, but could outrun the cadi's pet stallion and climb mountains like a goat. My selection proved a wise one, for Mohammed's horse fell twice and was badly hurt, and Brabisch had to use a second horse, his was so hurt by a fall at Guermessa. Brabisch was the son of the

Photo by Frank Edward Johnson

ON THE TRAIL BETWEEN DOUIRAT AND CHININI: MOHAMMED, BRABISCH, AND A SON OF SIDI HADJ

The boys have on the large straw summer hats worn all over extreme southern Tunisia

caliph of the tribes of Ourdana and the inseparable chum of Mohammed. The caliph confided his son to me during my journeys into the mountains.

A great quantity of food and provisions having been sent ahead with servants and Ben Sada, the cook, we started out one day for the Troglodyte town of Douirat. It took a long time to get started, as Mohammed insisted upon making some new cartridges. Every one goes fully armed, "to shoot quail," they said. Our trail passed through the lovely oasis of Foum Tatahouine and up the oued. Nothing but rocks and stones everywhere. About 8 kilometers from Tatahouine we visited a walled-in town of Rhorfas, looking like a small Médenine. It was silhouetted against the sky on the top of a hill. A great well was at the base of the hill and nomad women were drawing up water for themselves and their animals. The town was rather large and well preserved.

About 4 o'clock we came into the grateful shadow of the mountains, and our trail wound up and down precipices and was extremely wild. Coming out on top of the mountain range, we had an extensive view—a sky of azure blue, pinkish, purple mountains, and great stretches of golden sand, relieved here and there by tufts of silvery gray sage brush.

Several kilometers further on the trail opened out on a valley containing patches of barley and some fine olive and fig trees, and just before sunset we came to Douirat. It is difficult to describe and very bizarre—like a beehive mountain perched high over a deep ravine (picture, page 836). The village extends for about two kilometers; everywhere are caves and niches; in many places the trail zigzags up, and there are tiers above tiers of human Troglodyte dwellings. Above all rises the huge "ksar," or citadel, now a mass of ruins. At the foot of the ravine is a Troglodyte cemetery,

THE TOWN OF CHININI (DJEBEL CHARETTE), SHOWING "KSAR" OR CITADEL, MOSQUE, AND CAVES OF PRESENT INHABITANTS

Photo by Soler

Photo by Soler

ENTRANCE INTO THE TROGLODYTE TOWN OF CHININI (DJEBEL CHARETTE), WITH MOSQUE IN FOREGROUND AND KSAR IN BACKGROUND

Three-quarters of the town lies back of the place where the photograph was taken

Photo by Soler

THE KSAR OF BENI-BARKA

with several fine old maribout tombs crumbling to pieces. It reminds me of a huge human ant hill turned into a mountain and the ants the Troglodytes.

The sheik and headmen of Douirat, with Ben Sada and our servants, came out to meet us, and many were the glances cast at me, for they tell me that I am the first American ever seen. The sheik's cave had been arranged as a dining-room for us, and there were native and Kairowan carpets on the stone floor, and chairs and a table had been brought from somewhere. We took a walk through the town, but were glad to return to the cave, as there was a sharp wind. The changes from noon to midnight at Tatahouine average 22 degrees, and it is far more in the mountains.

A large wooden bowl of cous-cous was brought in that had been made by the women of the sheik's household, much to the chagrin of Ben Sada. Cous-cous is an Arab dish that one finds all over northern Africa. It is made of wheat prepared in a certain manner, so that it looks like very fine round grains of rice. It is boiled soft with vegetables, when they are to be found, and served with half or a whole sheep. It is highly seasoned with red peppers and is an excellent and nourishing dish.

Mohammed, Brabisch, the sheik, and I sat at the table. One's hands are washed just before eating and a wooden spoon is given to each. The host or his eldest son cuts the sheep into pieces with a hunting knife and all fall to. The great wooden bowl is placed on the floor or on a table about six inches high, with the men sitting tailor fashion around it. Each one eats out of the huge common dish, and choice bits of mutton are placed in front of one's portion by the host or his friends. With me there were knives, forks, plates, and goblets and linen napkins sent by the thoughtful cadi. In vain I protested. Ben Sada had orders that he carried out like a soldier.

Our table talk was, first of all, how I liked their country—was it not beautiful; had I ever breathed such air, or tasted such wonderful water, or seen finer olive trees? Then they would tell me of their pilgrimages to Mecca and details of the life of Mohammed and his leaders. Finally, they would want to know just where America was situated. On a voyage to Mecca the captain of the steamer had told the sheik that if he kept on through the Suez Canal, Red Sea, and past India and the Far East that he would reach America. That was clear to the sheik's mind. Another pilgrimage to Mecca and another captain on the return voyage told the same sheik that if he kept on past Tangiers (Morocco) and Gibraltar he would reach America; that was too much to believe.

Being a member of the National Geographic Society, it was my duty to enlighten these Troglodytes where our glorious land was situated. As we were in a country devoid of fruit and no toys, so that oranges, apples, or a ball were impossible to find, I joined two cous-cous plates together and explained on this improvised globe where Tunisia and northern Africa were; then Mecca and India. I did not imitate Columbus and use an egg, because Ben Sada had used all there were to make a succulent "chak-chuka," a native dish of eggs and lamb fried in olive oil with plenty of tomatoes (dried in pieces) and red peppers.

I am going to send a globe to my friend the cadi and some maps. Once or twice a month the sheiks of the different towns come to the large market to Foum Tatahouine and they are to learn geography in a practical way.

Mohammed and Brabisch go to school and study geography. Wherever I am or have been, a pin with ribbon is to be placed on the map to indicate, and they already have quite a collection of picture cards of America and France.

Of my first night in a Troglodyte cave the less said the better. The cave was cut out of soft rock about three meters wide and ten meters long and a little over two meters high. The floor and ceiling were strata of harder rock. The only light came through the sarcophagus-shaped doorway.

On one side of the cave stood huge pottery jars filled with olive oil. They were large enough for the forty thieves

of Ali-Baba to have hidden themselves in. In a niche were large wooden chests, and the usual collection of firearms hung from the rock wall. At the rear of the cave was another cave that served as a storehouse for saddles, wooden plows, gourbis, and household articles. Judging from the sounds, this second cave must have communicated by means of a tunnel with a subterranean stable, where the horses, mules, and donkeys were kept, for I heard the snarling of camels, the bleating of goats, and the constant barking of dogs, and it seemed as if all the fleas of Tunisia were jumping over me. My bed consisted of two Kairowan carpets and my steamer rug that served days as a saddle blanket.

From Douirat to Chinini the trail is very bad and slippery. The mountain sides are covered with esparto-grass. We passed superb large olive trees that the natives told me were the shoots taken from the olive trees planted by the Romans. Fig trees seem to thrive also.

As we neared Chinini we saw a very large and picturesque maribout to the left of our trail. To the right was a vast desert of sand and stones. The heat was great, and it was a comfort to dismount and take shelter in one of the caves of the sheik, which was particularly clean and attractive. It contained the usual arsenal of guns and pistols, cous-cous plates and covers, a Persian picture of the kaaba at Mecca, for the sheik had been there, and an assortment of Touareg cushions and decorative rugs from Kairowan and Persia.

The water for Chinini has to be carried from a well in an oasis of palm and olive trees over three kilometers from the town, situated down in the valley. It is brought up by the girls and women in great pottery jars or carried up in specially prepared goat skins on donkey back.

The dwellings of Chinini (pictures, pages 840-841) resemble those of Douirat—great caves dug into the mountain side and courtyards and small buildings of masonry in front of the caves.

Perched high above the rest of the town was the ksar, fortified citadel and storehouse in times of siege, fast tumbling to ruins, like all the other Troglodyte towns.

Some of the French officers have divided the Troglodytes of extreme southern Tunisia into three groups:

1st. Troglodytes that live under the earth, like Matmata.

2d. Troglodytes that live in caves or dig holes in the hillside.

3d. Climbing Troglodytes, such as we have seen at Douirat, Chinini, Bini Barker, and Ghourmessa.

Since I have visited them all and studied them in their homes—slept, eaten, and lived among them—it seems to me they are all originally climbing Troglodytes who have adopted the dwelling and abode best suited to their wants. Almost all of the Troglodytes are semi-nomads, and leave their mountain homes to wander in the plains and deserts that extend from their mountains to the Mediterranean, or pitch their gourbis on some mountain side far away from any village, where their goats and camels can find something to eat.

A number of men had come over from Ghourmessa to meet us and escort us to their towns, so that about 20 persons dined after us at Chinini. Many were the stories they told of feats of valor and bravery, of wars against Douirat and the other Troglodyte towns. The sheik told us how 20 years ago, when a woman went to fetch water from the well, five or six armed men had to go with her, and that at night 12 or 15 armed men patrolled the town lest men from another village would attack them. When attacked all the inhabitants would flee to the ksar, where the walls were very thick and where provisions of grain, olive oil, and water were always kept on hand. Some of these ksar have walls from six to ten meters thick, with one small gateway, where only one man can crawl through at a time, and the rhorfas are built one upon another to a height of from six to ten stories. One climbs up by means of projecting stones stuck in at random.

The sheik asked me if I had noticed the guns of the Caliph of Foum Tata-

Photo by Marie Helms

CAMEL AND MOSQUE: THE MAIN THINGS IN AFRICA

houine, one gun in particular, when I had dined with the caliph the week before. On the stock of the gun were 100 small cuts. Each cut meant the death of one of the enemy by a shot of the caliph's gun.

I understood now why Brabisch, that roguish, lovable boy, was such a deadly shot with his gun. Woe to the pigeon or hawk that flew across our trail. Off would tear Mohammed and Brabisch at full gallop. Bang! would go the gun and down flutter the game.

These men of the mountains are true sports, according to their code.

Ghourmessa is situated on the top of a sugar-loaf mountain with the point cut off. It dominates all the surrounding country, and is the wildest and most difficult of access. Its inhabitants are a warlike race, not friendly to strangers.

We were the guests of Sidi Hadj, a great friend of the cadi. He and his five sons had come half way to meet us. They are all married and have Troglodyte homes of their own, unlike the tribes around Matmata, where the head of the family lives with his wives, his sons, and his sons' wives and children in one of those large dwellings dug out of the earth. An Arab, no matter how old, is subject to his father, and cannot travel or do much without his father's permission. When a Mohammedan has been to Mecca he is called Sidi Hadj, and the more pilgrimages he makes to Mecca the more holy he becomes. Sidi Hadj had been three times and wore a green turban, showing that he is a direct descendant of "the Prophet."

Never shall I forget the sunset scene from the entrance of Sidi Hadj's cave. A narrow path ran in front, and from its edge one could drop a stone hundreds of meters down to the plains below. Mountain ranges stretched all around us, but to the southwest lay the Sahara, a golden reddish sea of sand and colors no man can paint and hardly imagine. A sirocco had been blowing all day, and the fine dust in the air turned the sunset colors into green, with ribbons of gold and purple. We all sat spellbound; no one spoke. The colors dimmed and faded into blue. Far below on the horizon were the tiny camp-fires of some nomads preparing their evening meal. Above us the stars came out one by one and formed "the dipper" upside down.

Ghoumrassen is another of the impor-

tant Troglodyte towns, of about 3,000 inhabitants. Its caves seem larger and deeper than any others that I visited.

The Sheik of Ghoumrassen had just finished an addition to his dwelling. He had hired men to excavate an inner cave 13 meters long by 4 meters broad and about 3 meters high. It took seven men not quite one month to cut it out of the solid rock. These caves have several good points. Rats and mice and insects cannot get in, and there is no danger from scorpions or vipers, and they are delightfully cool on a hot day and warm on cold nights.

My adventures with my two devoted friends, Mohammed Ben Cadi and Brabisch Ben Caliph, would fill a book. They escorted me to every known and unknown Troglodyte town, village, or cave—Beni-Barka, Guetofa, and Gedini, and a score or more of places hidden away in some mountain wilderness. Thanks to them and the Cadi du Djebel-El-Abiodh, whose thoughtful kindness I can never repay.

In closing, let me say that the majority of French officers stationed in the out-of-the-way places of northern Africa are a splendid set of men, whom it has been a pleasure and privilege to meet—men in the highest sense of the word, doing their duty and putting heart and soul into their work. It is owing to these almost unknown men that Tunisia has made such great progress during the past 30 years. These men of war turn to agriculture and teach the Arabs how to improve their olive trees; how to graft new life into old trees; how to breed better cattle and horses; to raise more barley on their dry soil; make plans for piping water and digging wells; turn doctor and heal their diseased and suffering families. In short, bring order and system out of chaos, establish schools, law and order, and make peace reign where 30 years ago was rapine, fire, and sword.

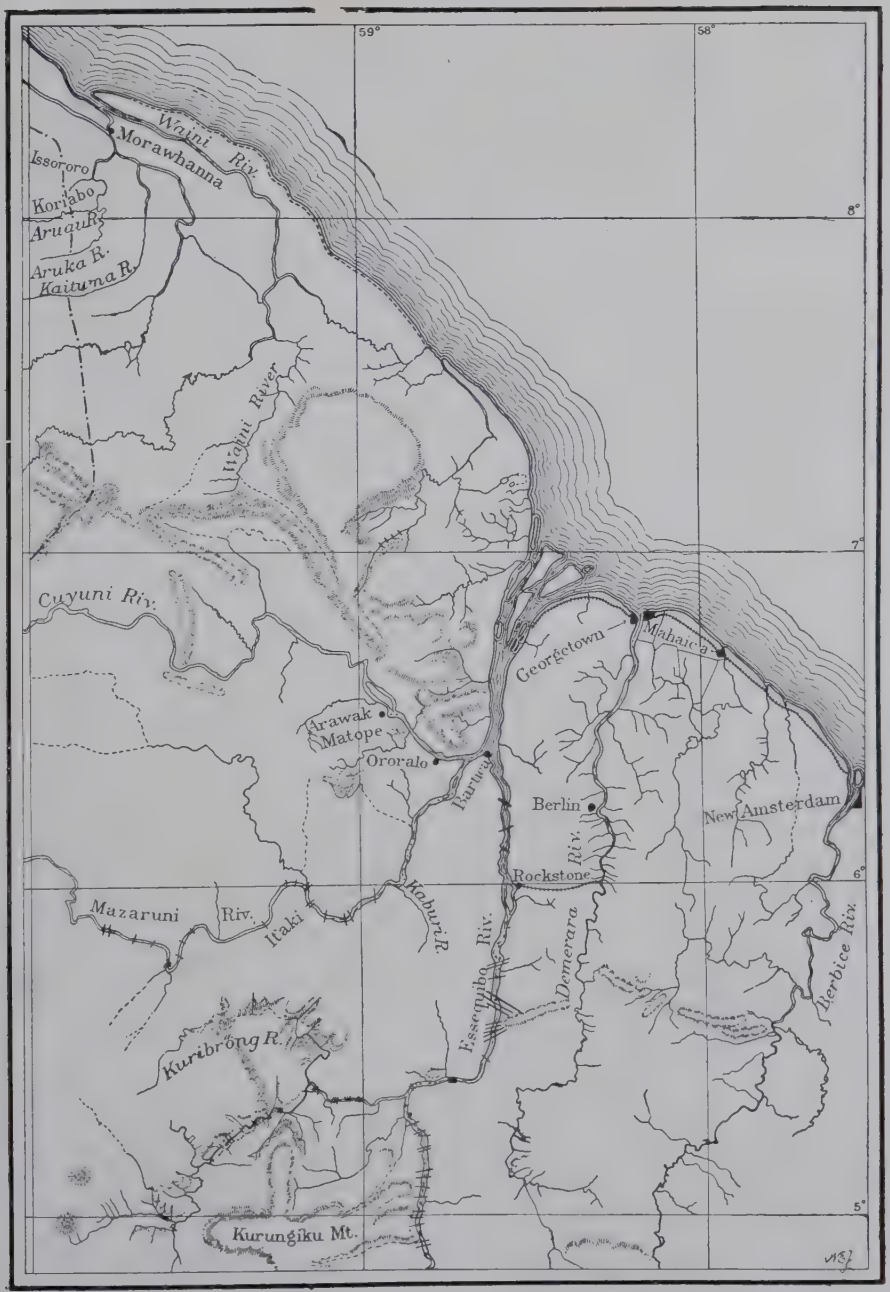
# THE WORLD'S GREATEST WATERFALL: THE KAIETEUR FALL, IN BRITISH GUIANA

By Leonard Kennedy

MY INTENTION, when I left New York as one of two passengers on the steamship *Suriname,* of the Royal Dutch West India Mail Line, was to spend a short vacation out of the way of things. My ticket read to "Georgetown, British Guiana," and that was almost all I knew about it. The day previous I had met a gentleman from Georgetown, who had advised me to make that city my destination. "It is interesting," he said, "and there is a waterfall back in the bush worth seeing. Discovered 40 years ago, it has been visited very seldom. I think I am the only man in America who has seen it, yet it is five times as high as Niagara and ranks in magnificence with anything in the world."

So I landed in Georgetown indefinitely expectant. As a traveler with some experience in hidden Europe, I planned to loftily present an omnipotent dollar to the "concierge" and allow him to make the arrangements for me to start inland the next day. I was disappointed, somewhat agreeably, to find that the type was unknown. There were no pleasure-seeking tourists and so no concierge. I fell back on a letter of introduction to a hustling young American named Crane. "I'll put you through," he told me, "though I have no idea how."

Together we found a man who had made the trip. He was a rarity, even in Georgetown. "Sproston's," he informed us, would get me as far as Potaro Landing, and after that Indians were best. Sproston's, I learned, was the transportation company of the province and an institution of tremendous importance




OUTLINE MAP OF BRITISH GUIANA

where the rivers are the only highways. Like most of the men I met there, Mr. Goring, the manager of Sproston's, was willing to do anything he could to help me. He was skeptical, but promised to write to his agent on the Potaro and ask if there was any one there who would take me to Kaieteur Fall. This he immediately did; but things go slowly on the frontier, and it was more than a week before he received an answer.

Meanwhile I had a chance to become acquainted with Georgetown. It is a comfortable place, kept cool by the steady trade winds and well governed, as British colonies are. The streets are wide, and through the center of many are canals filled with enormous Victoria Regia water lilies. Back from the street, and usually behind a row of stately palms, are the peculiar "peek-a-boo" houses. The only familiar edifice was a Carnegie library of the standard type. The rest of the buildings were usually of wood—of pine, by the way, from our Northern forests—and raised high on piles, for the whole city is below the level of the sea and a ground floor would be unhealthful for habitation. Beside almost every house is a cistern, into which the rain water from the roof is drained. This provides the only source of pure water, but so regular are the rains that there is never a moment of worry about the supply.

The people are without doubt the most interesting sight in Georgetown. There are as many types as there are illustrations in a text-book on anthropology. African negroes, coolies from India, Portuguese, Chinamen, native Indians, and the English form the constituent parts. Intermarriage has complicated matters, so that types of faces, dress, and even religions have increased by geometrical progression into a hopelessly intricate sociological mess. I met one lady of good social standing who was a Dutch negro Jewess, while a coal-black Chinaman with curly yellow hair walked in the streets unnoticed but by me. It was most amusing to hear these various types talking to one another in the broadest London accent.

Even the monetary system is a half-breed affair. Prices are quoted in American dollars, yet the coins are English and a shilling is 24 cents. There are colonial bank notes marked $5, though worth only a pound, and there are silver four-penny pieces descended from the old Dutch "bit".

The town itself does not wear well, for the amusements are few. The botanical garden is said to be one of the most beautiful in the world, just as similar gardens in Java and Ceylon claim the distinction. A drive is interesting along the old sea-wall, which was built by the Dutch when they settled there and the British were in possession of what is now Dutch Guiana.

I was glad when an answer finally came from Mr. Goring's inquiry. An Indian named William Grant was ready with a crew of six men to take me from Potaro Landing to the fall. I was surprised at the name "William Grant," but I later learned that the Indians have several sets of names, graded according to intimacy. To tell a white man their native names would be to give him power to call down the devil on their fortunes.

I arranged to close the contract with Grant at once, and began to make my preparations for the trip. It rains pretty much all the year round in Guiana, very hard and very suddenly, so that several changes of clothes are essential. Likewise I had to carry 10 days' provisions and all the necessities for sleeping in the bush. It was no easy matter to judge of the right things for such a trip, and I constantly turned to experienced advice. Woolens, for example, do not sound logical within a few degrees of the equator, but fortunately I was persuaded to wear them. They absorb the moisture both from within and without, and so prevent the chills that are usually followed by malaria, where that disease is always in the air. It is never insufferably hot in Guiana; in fact, very rarely even uncomfortably so, if one avoids violent exercise. All the year the temperature stays about the same, and I must admit that for a short visit the cli-

Photo by Leonard Kennedy

ONE SIDE OF KAIETEUR FALLS FROM THE EDGE OF THE CANYON: BRITISH GUIANA

Photo by Leonard Kennedy

LOOKING ACROSS POTARO RIVER AT THE BRINK OF KAIETEUR FALLS: THE RIVER IS 369 FEET WIDE AT THE BRINK

mate is a great relief from the extremes of our Northern States.

On a beautiful Monday in August I started from Georgetown on a small steamer up the Demerara River. Beside my kit and provisions I took with me a negro boy to cook and in my pocket letters of introduction to Sproston's agents along the first part of the way.

The Demerara flows through a low flat country of alluvial mud, so that the tide can be felt 80 miles from the mouth. At Georgetown it is so shallow that the steamers entering the port literally plow through the mud and at full speed barely crawl to their wharves. Forty years ago a vessel was wrecked off the coast of Guiana, and the mud has built around it until today it is an inhabited island covered with tall palms. Just outside of Georgetown the river steamer passes the big sugar estates established long ago by grants from the Crown. They are worked by coolies brought over from India, but they seem to have passed their age of prosperity, and the tall brick chimneys on many of them have been left to crumble. Further on the country grew wilder and we passed between shores thickly covered by the jungle. To be sure, this jungle is not true to the pictures in the children's geography, in which birds, monkeys, lions, and a rhinoceros or two peacefully pose in a group for the artist, but the Guiana jungle is, nevertheless, the real thing.

Now and then we would come suddenly upon an arch in the trees, through which I could catch a glimpse of a clearing and a tiny house thatched with palm leaves. In such a home the contented coolie, who has served his five-year term of indenture on the sugar estate, lives in plenty—I cannot imagine how—the rest of a peaceful life. It was very amusing to notice that even in these isolated oriental settlements in South America Monday was celebrated according to convention. The week's wash, scant to be sure, was displayed conspicuously everywhere. Occasionally one of these lagoons in the forest would present a busier scene, and several dugouts would come out to the steamer to take off freight or mail. Then the captain would tell me that behind there they made charcoal or grew cocoa, as the case might be.

So the day passed from 8 in the morning till 5 in the afternoon, when we arrived at the steamer landing at Wismar.

The town was a tiny place, consisting of the landing stage, a railroad station, a store, a gin shop, and half a dozen huts. But the fact that it is the terminus of the Demerara-Essequibo Railroad gives it some activity.

This railroad connects the two most important rivers of the province. It is, of course, narrow-gauged and poorly built, but any sort of railroad is a blessing in Guiana. The line runs over ground as sandy as a beach—and indeed that is what it used to be. All the country below that point has been built out into the ocean, just as the island was built from the schooner's wreck. The stations were marked by signs and by one house apiece. There was apparently no trail leading anywhere, and no one ever started away until after the train left. I was told, however, that these stations are the centers of a hard-wood lumber trade which the railroad company itself carries on.

Rockstone, the Essequibo terminus of the road, was hardly more imposing than Wismar. The bank of the river here is a rather indefinable line between a swamp and the shallow water. The track is built on an artificial embankment, and a surprisingly good hotel was at the time approachable only by a bridge. It had been built in the more palmy days of gold-digging and on its register were names from all over the world. On the two nights I stayed there I was the only guest.

At 6:30 on Tuesday morning the launch started for Tumatumari, and all day it fought against the current between the monotonous shores. As a matter of fact, I hardly once saw the shore itself, for the bush is so thick that it grows out into the river, leaving only lagoons by which the interior can be reached.

It surprised me to find the Essequibo such a formidable stream. I had always considered the Hudson something of a river, but the unknown Essequibo drains five times the area and is twice as long.

Early in the afternoon we left the great river and entered the mouth of the Potaro, itself a stream of no mean proportions. A few hours later Tumatumari, a tiny habitation built on a hill by the side of a cataract, hove in sight. We landed before sunset. I understood it was exactly 6 o'clock, but I later found out that it is always 6 when the boat arrives. The only reliable watch of the village belongs to the agent of Sproston's, who takes great pride in the promptness of the launch.

Upon landing I presented letters to the Chinese storekeeper and to the government agent, a young man named Christiani. The latter put me up in his attractive bungalow. His hospitality was of a sort that one rarely finds off the frontier and I was sorry to leave him early the next day.

There was a hut in the village which interested me. A good deal of American oil is used in the colony, imported in tins, which in turn are boxed to keep them from denting. The hut which drew my interest was walled by these boxes and roofed with the tins. This was merely an example of the use to which "tidewater" tins were put, for they are an article of standard value throughout the colony.

At Tumatumari I met my crew of seven Indians. Grant was the only one of them who could speak English, but they were a splendid lot, just civilized enough to be willing to work for a white man and still unspoiled. Taking them in the launch with me I reached Potaro Landing at noon. We cooked our breakfast on the clearing in front of the storehouse, for the landing is absolutely the last river settlement and it does not afford a rest-house or even a store.

After our meal the Indians strapped the boxes of provisions on their naked backs, and we started on a seven-mile tramp through the bush to a spot dignified by the name of Kangarooma. The river above Potaro Landing turns at a sharp angle and is blocked by a cataract. By walking across we shortened the distance and portaged the fall.

On the march we used every precaution against poisonous snakes. We actually came across only one, which we carefully avoided. I carried with me some strong ammonia as well as a sharp knife and a bandage, for although the dangerous snakes are rare one must be prepared in case of an attack.

I am thankful to a defunct rubber company for the accommodations they have left along the Potaro. At Kangarooma there is a clearing, now overgrown with thick underbrush, and a house of galvanized iron, where I hung my hammock on Wednesday night. There are drawbacks to such shelters in the jungle, however. The bats and spiders which had made this hut their home were not at all compatible to my temperament. I found myself dreaming of them in the night.

All the boxes could not be brought over from Potaro Landing in one carry, so the next morning was spent in finishing the job. It was not until 2 o'clock that we started again.

The boat that we found at Kangarooma was a flat-bottomed punt that leaked badly, but it held us up and made some headway against the strong current. The boxes were piled in the middle and a large piece of canvas which we used for a shelter at night made a comfortable seat for me on top of them. Grant, standing in the stern, held a large oar with which to steer. The other six took their position along the side, with one in front of the others to set the stroke. It was a peculiar stroke, as if they were digging holes in the water, using the paddles on the side of the boat as a lever. Between the strokes they would touch the middle of the oars on the gunwale, so that they could keep in time by the sound. Every minute or so the bowman would splash the water high in the air and follow by a half stroke to vary the monotony. It was slow work, but by keeping it up all day the curves in the river changed before and behind us, and so I knew that we made headway.

That night we camped by the side of the river, spreading the great tarpaulin above us for a shelter. The Indians were wonderfully skillful in woodcraft, and it was amusing to see with what scorn they watched my negro cook making a fire out of wet wood.

By 6 the next morning we had our coffee and were off again. Sticking close to the bank to avoid the current, it was, nevertheless, a hard pull, and once the men got out into water up to their waists and dragged the boat through some rapids. I was afraid one of the big alligators which we frequently saw along the bank would be tempted to take a bite of them, but fortunately no such accident occurred. Fish are more dangerous. One variety numbs by an actual electric shock and then feasts on the body of its victim. Another sort is fitted with the sharpest enameled teeth and can bite off a finger or toe at a snap. There is likewise a fish whose sting is dangerous.

We reached Amatuk Falls in time for breakfast and made the portage by noon. The falls are not high, but I clambered out into the rocks in the middle of the river and had a very pretty view of them, with the water roaring about my feet. We passed on by 1 o'clock and the chug and click of the paddles continued up the river. By 6 we had come nearly to the next portage at the Waratuk Cataract. The darkness comes abruptly, however,

Photo by C. H. Eigenmann

ANOTHER VIEW OF KAIETEUR FALLS

and it is very difficult to make camp after sunset, so wherever we were at the proper moment we made preparations for the night.

A lantern always hung by my hammock while I slept to keep away the vampire bats, and by its light the Indians used to begin the morning chores. The dawn breaks as suddenly as the night falls, yet they always seemed to know just a few minutes before that it was coming. It was generally 5:30 when we climbed out of our hammocks for coffee.

On Saturday morning we were away early and within two hours we reached Waratuk portage. The cataract here has no straight fall. For 100 yards it rushes down over great rocks in a seething turbulence which would defy the staunchest boat. At this point the only real hitch in the expedition occurred.

The third of the defunct rubber com-

pany's boats was supposed to be at the head of the portage, but no boat was to be found. Evidently some Indian with a grudge against the white man, or perhaps the flood of the river, had carried it over the rapids. On our return we found a shattered fragment down the stream.

My first thought was that it would be possible to walk the remaining distance to Kaieteur; but Grant had seen me blundering across the slippery saplings that bridged the frequent streams from Potaro to Kangarooma. He informed me that the Indians might do it, but for me it was impossible. Fortunately, he knew where two dugouts were, 10 miles up the stream and on the other side. So I sent four of the Indians in search of them, while the rest of us settled down as comfortably as possible to await their return.

Unlike the negro, the Indian does not like to be idle. The three who remained with me at once set to work bleeding balata trees in the neighborhood of our camp. Balata is an inferior species of rubber and forms one of the chief exports of the colony. In each tree several long slashes were made at angles running into each other. A gourd was fixed at the bottom as a receptacle for the gum. In this way they gathered several pounds of the raw balata, which they presented to me.

Not until the next morning did the Indians return. There had been some hope that they would find the large boat, but they came back with only the two dugouts, which they called "curyalls". It was therefore necessary to leave a base at Waratuk and, with four of the Indians and only necessities, cover the remaining distance.

We lost no time in starting. In the center of one of the unsteady little shells were placed a tarpaulin, a box of provisions, and the hammocks, while in the other I carefully seated myself. An Indian in the bow and stern of each had no trouble to make himself comfortable. By the time the shadow of my broad-brimmed hat formed a circle about my feet we were off. We managed the rapids beautifully in such shells, and our speed was a great improvement over that of the clumsy boats we had been using. Before we had paddled 15 minutes we turned a bend in the river and Kaieteur appeared far in front of us, a narrow white dot against the green foliage and blue sky.

From that point on the gorge through which the fall has cut its way during the ages opened up more clearly. Massive precipitous rocks rose out of the jungle beside us as sharply as the sides of a Norwegian fjord. Suggestive also of the Scandinavian fjords were the lace-like waterfalls that came tumbling down from these heights.

It was a hard journey in our tiny boats through this imposing canyon to the rapids known as Tukeit. Here, through some freak of nature, there is a clearing by the side of the river, the first break in the forest I had seen since leaving Kangarooma, four days back. We easily knocked a temporary shelter into being and made ourselves at home for the night. It was a swampy home and smelled of malaria, but I took a double dose of quinine and slept well.

The rain fell in torrents in the night and one of my Indians suffered from his exposure the next day. My only discomforture lay in the fact that I had left my cook at Waratuk. The Indians did their best to help me, but their cakes of plain flour and water made into a dough and very much under-cooked did not tempt me. I lived on cold corned beef from Chicago and Uneeda biscuits, washed down with muddy coffee and condensed milk.

From Tukeit it is four miles in a straight line to Kaieteur, but the valley through which the river flows is quite impassable. Huge boulders block the way, and, as far as I know, no one has ever reached the bottom of the fall. Our route lay up the steep side of the gorge along a trail which I could not recognize as such, but which to the Indian is the highway to Brazil. With no idea of zigzagging up the side of a mountain, the Indian has applied the principle that a straight line is the shortest path between two points, no matter what the angle.

Photo by C. H. Eigenmann

THE EVER-CHANGING SHAPE AND MISTS OF KAIETEUR FALLS

The journey resembled climbing a ladder of stone.

Once, on our way, we crossed a stream that tumbled down over a bed of smooth rock. Along its course monoliths of very regular formations added to the picturesque view. I stopped to admire the sight, glad of a chance to rest. Never have I been so hot as I was on that climb. One does not realize the debilitating heat of the tropics while sitting still in the breeze. But the violent exercise, laden down as I was with my share of the burdens, brought every particle of heat in my body to the surface. I found that the perspiration was running off the ends of my fingers and shaking from my face with the jar of every step. The stones under foot were moist and slippery, and considerable extra muscular effort was needed to keep a firm footing and avoid a fall. All the time we remained in the jungle. Only once, by going out of our way, did we catch a glimpse through the foliage of the other side of the ravine.

It was a great relief when I finally sat down on a fallen tree at the top of the gorge and called for water. We had halted at the edge of the small savanna that borders the bank of the river at this point. Out on to this sandstone plateau Grant went with a saucepan to get me a drink. In a minute he returned, bringing me a cup of liquid the color and temperature of tea. Protest was useless. It was a 20-minute walk to the river above the fall, and meanwhile the only water obtainable was from the shallow pools in the rock, where the sun had beaten down upon it for hours.

I was eager to reach the fall. Leaving the others behind to make camp, Grant and I, armed with my camera, and the umbrella for shade, started at once. The edge of the jungle is abrupt. A few steps brought us out on to the Kaieteur savanna. This interesting plateau, covering not more than a square mile, is a barren stretch of level sandstone. A fibrous plant, very much like sisal, and an abundance of rare orchids are about all that thrive on the wet rocks. Scraggy bushes struggle along in the hollows, where a little soil has collected, and impede the otherwise easy walking. From this savanna we had an opportunity for the first time to look out over a wide stretch of country. In the purple distance to the southwest we saw mountains on the Brazilian line, many miles away.

Plodding on over the plateau, we dived into a clump of bushes that bordered it and a moment later came out upon the brink of a precipice which fell perpendicularly below us 800 feet. Opposite rose majestically the other side of the gorge. To the right, perhaps 500 yards away, I saw the fall!

It is impossible to describe the emotion of awe which came over me as I stood there with my single Indian guide gazing upon that obscure and isolated wonder of the world. It was some time before the definite impression of details began to strike me.

Grant was talking in his peculiar "baby" English. "The Fall of the Old Man," he said, "in our talk, '*Kaietuk*.' Long ago an old man of the village above here had so many 'jiggers' in his feet he was no more use. So they tied him in a canoe and let him go. He turned to stone, and his boat, too. You see him?" It was true that in the turbulent mass at the foot of the fall two of the boulders stood out clearly in the shape of an old man and his canoe.

There was no way to judge of the comparative size of the fall from where I stood. I remembered that in Saint Peter's, in Rome, I had judged from one end of the long nave that an angel at the other was on a level with my eyes; yet when I reached the angel I found it far above me. The same illusion distorted Kaieteur. I tried to recall some structure 750 feet high. It occurred to me that the Metropolitan Life tower in New York was not so tall! The comparison was striking.

I was greatly impressed by the softness of the monstrous fall. A smooth but rapid river nearly 400 feet wide flows quietly to the brink and turns quietly downward. In its fall it breaks into soft white mist and reaches the bottom in a chaos of seething clouds.

Photo by Leonard Kennedy

KAIETEUR FALLS, IN BRITISH GUIANA: THE DROP IS 741 FEET, OR ABOUT FIVE TIMES AS HIGH AS NIAGARA

Photo by Leonard Kennedy

LOOKING DOWN KAIETEUR GORGE FROM THE BRINK OF THE FALL

There is a gentle roar. Only now and then a deep, thunderous growl arose from the hidden caverns at the bottom, giving some idea of the forces which contended there.

Above I could follow the path of the Potaro between the trees for a mile or so, and further off the country became rolling; in the distance, mountainous. The precipitous banks of the river curved in a semicircle, with the fall at the head. Directly below me the river rushed among huge boulders, as if terrified by the shock it had just received. The gray sandstone of which the gorge is formed was covered in many places by a thick growth of brilliant green moss, watered by the spray which constantly rises in clouds from the bottom of Kaieteur. The radiant color of that moss was almost the only touch of brilliancy I ever saw in the Guiana bush. Looking back through the valley up which I had come, another glorious view was opened. The higher plain was perfectly level as far as the eye could see. Through it the great gorge was cut, its twisting sides in equal slopes covered with tropical forests. The sky was of a dazzling blue, covered in part by fleecy gray clouds. Nature had formed a conspiracy to astound the eye of man.

From our vantage point we made our way along the edge of the canyon till we stood at the brink of the fall itself. Here we rested and enjoyed the cooler water of the river, for my thirst had not yet deserted me. In exploring the region and looking from different viewpoints at Kaieteur, we spent most of the day. We slept at Tukeit once more. And so our trip down the river began.

The return was almost uneventful. Two of my Indians contracted the fever and I left them at Kangarooma, where the others returned to them after bringing me to Potaro Landing. I hope they recovered; but, naturally, I never heard of them again. Traveling with the current, I made much better time than on my trip inland. Passing all the familiar points, I reached Georgetown on Saturday.

Today, seated in my study and surrounded by things of comfort, it is a boundless pleasure in which I often indulge to dream of Kaieteur. In the day, when my thoughts are elsewhere, and in the night, when I am sleeping, its flowing waters never cease to fall. And when my mind, wearied of the shrieking city, seeks the fastness of the Guiana jungle, Kaieteur is still tumbling there, undisturbed by man.

# NOTES FROM A NATURALIST'S EXPERIENCES IN BRITISH GUIANA

By C. H. Eigenmann*

IT IS natural that British Guiana should have been settled by the Dutch, for "the coast lands are flat and for the most part swampy, being slightly depressed below the level of ordinary spring tides, so that sea-walls and other defenses have to be constructed to protect the settled parts of the coast lands from being flooded at high tides." The low land extends for 10 to 40 miles into the interior, and most of the cultivated area lies in this belt.

Beyond the low land comes a belt of undulating country, in part at least made up of old sand dunes and covered for the most part by forests. South of the sand dunes comes the hinterland, forming eleven-twelfths of the area of the colony and sloping up to 900 feet above sea-level at the source of the Takutu, on the western boundary, and about 400 feet at the source of the Courantyne, on the eastern boundary, and containing several mountain ranges.

"One of the most prominent features of the country is the great central mass of mostly flat-topped mountains, known as the Pakaraima group or chain, which occupies the most western portion of the colony, and stretches southward from the Cuyuni River to within 30 miles above the mouth of the Ireng River, and eastward to the Essequibo River, right across the colony as far as the Courantyne River." This area culminates in Mount Roraima, 12 square miles in area and rising 8,635 feet above the sea, the last 2,000 feet of which rise as perpendicular cliffs of sandstone from the surrounding country.

The rivers of the plateau leave it over high falls, of which the Kaieteur of the Potaro is the most famous. Rivers there are in abundance in the entire colony. Most of them are crossed by dikes, dividing them into stretches that are navigable, and others full of rapids and falls. The principal rivers are the Demerara and the Essequibo, to the latter of which the Cuyuni, Mazaruni, Potaro, and Rupununi are the principal tributaries.

I had two main objects in going to

* Abstracted from "The Fresh Water Fishes of British Guiana," by C. H. Eigenmann. Vol. V, of Memoirs of the Carnegie Museum, Pittsburgh.

Photos by C. H. Eigenmann

NATIVE COSTUMES AT HOLMIA: THE FAMILY OF ONE OF THE CREW COME TO CALL

AN EAST INDIAN COOLIE WHO WORKS ON ONE OF THE SUGAR-CANE PLANTATIONS

Part of our Indians were jolly, naked savages from near Holmia; the others were surly fellows, dressed in shirt and trousers, and had come from Brazil

British Guiana. I wanted to secure as many representatives of Characins, the dominant family of fresh-water fishes, as possible, and to compare the fish fauna of the plateau with that of the lowland. The former became an incident in the study of the latter question.

From August to December is the long dry season in Guiana. In consequence the upper portions of the rivers are lowest in October and November, and the fishes concentrate in the channels of the streams. We had rain during the first week of our stay in Guiana, but later were interrupted by rain or high water but once. While on the Guiana plateau at Holmia the rain of a day and a night raised the river many feet.

I sailed from New York on August 23, arriving in Georgetown on Sunday, September 6. Every calory of energy was consumed with the one object of making the trip a successful one. Whether we were successful or not may be judged by the fact that whereas but 116 species had been known to occur in British Guiana, there are now known to be 360. Of those added, 28 genera and 127 species were new.

The steamer left Georgetown at 8 a. m. and reached Wismar at 4:30. The water is muddy to about Berlin and becomes blackish farther up. Wismar is about 65 miles above Georgetown in a straight line. The Demerara is navigable to ocean-going sailing vessels to this point and is affected by the tide to the first cataract, about 100 miles from Georgetown in a straight line. The entire region from Georgetown to Wismar is flat except for occasional sand hills—old mud dunes. Creeks enter the Demerara from both sides about Wismar. These creeks are also affected by the tide, which gives rise to a peculiar mode of fishing.

Most of the mouths of the creeks are provided with partial fences built of poles and palm or banana leaves. The center is ordinarily left open for the flow of the tide. A mat can be placed in the gap which will prevent fishes from coming out of the creek (see picture, page 863). When the tide is high at night and fishes have left the main stream for the creek, the mat is put in place. In the morning, when the tide is out, the fishes trapped are either killed with a cutlass or poisoned. Many of our specimens were obtained in this way. The creeks are so full of brush that all ordinary methods of fishing are out of the question.

Photo by C. H. Eigenmann

ONE OF THE CREW WEAVING A BASKET TO SERVE AS A BIRD-CAGE, AT HOLMIA

The lower lip is pierced. Pins are carried thrust through the lip

Except in a very few favorable places, the banks and shallows of the Demerara are so profusely grown with *Caladium arborescens* that the seine could not be used. I engaged fishermen to collect for me some distance below Wismar and had a creek poisoned at Kumaka. From all of these places I secured 90 species, six of which were not taken elsewhere.

From Wismar we took the train for

Rockstone, on the Essequibo River. Rockstone consists of a hotel, the railroad, steamer terminal station, a small store, and a number of workmen's cottages. All goods for the gold mines of the interior and all rubber coming from the interior are transferred here to avoid the cataracts in the Essequibo below Rockstone. All fever patients coming from the interior and all travelers going into the interior must remain here over night. The Essequibo is here divided into two channels by Gluck Island. At the time of our visit rocks were exposed at the Stelling and a short distance below Rockstone. At the bend of the river above Rockstone there was an extensive sandbar exposed.

I engaged two Indians, who were on a rubber boat waiting for a crew, to go up the Rupununi. We worked faithfully along the Stelling and below, with the poorest success I ever had anywhere. We could see fishes galore. One especially (*Chalceus macrolepidotus*), lustrous plumbeous with the most gorgeous, maroon-colored fins, flaunted its colors in my face, but it was impossible to get at it. At 10 we came to the hotel, I completely worn out, for this was the place where we were told we should catch fishes.

As we were waiting for breakfast a band of Indians came along, a man and about six girls and women. After parleying, it turned out that they were going to poison a creek. We asked them to wait at the station till we could join them and rushed through breakfast.

After skirting Gluck Island some time they stopped at a creek so small that I thought it could have no fishes (see picture, page 865). Two of the Indian women scraped a small depression into the ground, cut two sticks and used them as pestles and the depression as a mortar, in which they pounded a basketful of leaves to a pulp. They then built a fence across the creek with palm leaves, scraped the mud from their mortar into balls, and squeezed and washed them in the water some distance up the creek. The Indians and I were soon knee deep in water and mud, picking up the fishes that at once came to the surface. The little ones died in numbers on the banks; the bigger ones revived.

I ate dinner with a somewhat better feeling, but determined to use our big 150-foot net on the sandbank after dinner. The porters were all gone when we got to the station, but I picked up two negroes, took one of our Indians, and Mr. Kingsland, the agent at Wismar, went along. The crew played the most interesting tunes with their paddles. Whenever they became tired the leader would get all of them to hit the boat with their paddles at one or another part of the stroke with surprising results.

We landed on a place that looked as though it had been made for us. It was a shallow bay on the upper end of the sandbank, 150 feet across and with sand bottom. We stretched the big net across and hauled out at the head of the bay. Fish were flopping in every direction; dozens jumped over the net. At the critical moment enthusiasm got the better of even our Indian, who ran ashore with the top of the net and let out half the catch.

The next day till evening was devoted to sorting and preserving fishes. *Prochilodus*, a sucker-like Characin, gave us much trouble. Full-strength alcohol and formalin injected did not keep these from beginning to decay. In the evening we seined on the rocks of the Stelling and in the railroad mentioned above. At the Stelling we caught so many *Hemidoras carinatus*, a catfish with a row of spines along the side, and allies, all of whom erect their spines when caught, that it took us a long time to untangle them from the net. The pectoral spine is provided with retrorse hooks, and every spine must be individually disentangled from the net.

On the second of October we went to the Rockstone sandbar with our two Indians. We were soon joined by seven porters from Rockstone, who helped us pull the large net at the lower end of the sandbar. The chief things we secured were examples of *Geophagus* carrying young in their mouths. The

Photo by C. H. Eigenmann

A TRAP FENCE ACROSS A CREEK EMPTYING INTO THE DEMERARA RIVER ABOVE WISMAR, AT LOW TIDE (SEE TEXT, PAGE 861)

outer edge of the bar was almost barren, but yielded a few specimens of a minute, translucent Characidium that so resembles our sand-burrowing darters that we were amply paid for our heavy work.

But the greatest success was obtained in a slough between the upper half of the bar and the land, where the Indians took half a bushel of small fishes. There was a great general similarity between the contents of the net here and one drawn at any similar locality in the Mississippi Valley, although not a single Mississippi Valley species or genus was found in the catches. Here we secured the only specimen, a much mutilated one, of the widely distributed *Symbranchus*, and the young of many species of large fishes. Before starting for the sand-bank I had an opportunity of securing a laulau, a large catfish, but in the hurry of getting off and on account of a momentary penuriousness, I took only the head.

On counting noses, which has taken two full years since my return, I find that Rockstone, where our fishing began so discouragingly, is the richest in species of all the localities examined. This was no doubt due to the fact that conditions

for collecting were favorable. The water was low and we fished exhaustively in a variety of places. No doubt many channel fishes living here we did not get. Altogether we got 127 species, 78 of which were Characins. Of the 127 species, 14 were not taken elsewhere.

Tumatumari, whither we now proceeded, owes its existence to a cataract in the Potaro River. The goods brought up by the launch to the lower landing are transported by cart to the upper landing, and this transport gives employment for nearly all of the inhabitants. At the time of our visit the stream was confined to the northern channel, the southern channel being entirely dry. We made headquarters in the Sproston's rest-house, from where we had a look across the cataract. We collected on sandbars above and below the cataract, in the cataract itself, and in a little stream emptying from the south just below the cataract. Our experience in fishing may be quoted from letters home.

"We fished upstream until we came to a deep pool. The nondescript helping us did not know how to fish, and stepped on a spiny palm branch, besides; so I got in and told him to take a big club and beat the water to drive the fishes down. He did this slowly. Shideler and I then took up the net, for the banks were so steep and full of snags there was no place to haul it ashore.

"We were walking downstream, with the bag of the net in the water, to a place where we could land, when Shideler said: 'I believe we have an electric eel, for I have had two slight shocks.' I envied him, but too soon, for just then I got a good shock from my ankle to my knee. I jumped and yelled, not so much from pain as from the unexpected shock.

"We found we had five eels in the net, the largest three feet long, and it took manœuvering to get them into the buckets."

The "numb fish" early excited the interest of naturalists, and thus directed attention to the fish fauna of the Guianas. The first notice of the fishes of the Essequibo was an account of the doings of the electric eel, and in the second paper Bancroft attributed the shocks delivered by the electric eel to electricity. Humboldt described how his assistants drove some horses into the water to exhaust the eels; whereupon it became generally accepted that this was the usual method of fishing, although it is doubtful whether this method was ever tried more than the one time, when Humboldt saw it.

On the sandbank across from the lower landing we caught two more electric eels in a net well filled with fishes. It was surprising how soon everything was quiet in the flopping netful of fishes with such customers. I opened one of the eels and found small fishes in its stomach. I put a twig through the gill of the largest eel, for we proposed to eat it. I had the eel in one hand, and, in order to pick up the net, I put the lantern in the same hand; but as soon as the lantern touched the eel I got a shock through the handle. It was not a heavy shock, but I did not know how much heavier it might become, and so gave up that way of managing.

When I came to pick up the net containing the other eel I got another slight shock and concluded I needed help. We ate part of the largest eel. The electric organ was pasty, and the rest was so full of bones that we did not succeed with it.

At Amatuk I enjoyed especially the lazily flopping butterflies crossing the river, and the flying fishes (*Gasteropelicus*). The latter would dart up in front of us, cut through the water, leaving the breast or tail in, and beating the water with their pectorals. They would cut through the water for 40 or more feet and then leave it entirely for five or ten feet. At the end of their flight they would fall sidewise into the water. At first it looked to be a long, slender fish, but by watching near the end of the flight, when the momentum was gone, the shape could readily be made out. To make sure, I asked the Indians to point out the fish when we seined. William pointed at a long, slender Creatochanes; but the naked hunter shook his head and

Photo by C. H. Eigenmann

PREPARING TO POISON A CREEK

A small bar of palm leaves has been built across the mouth of the creek (see page 862)

with thumb and forefinger made a circle, which left no doubt that he knew the fish. We caught none in the Potaro, where we saw them in great numbers, but we got them in abundance in the lower Demerara. *Carnegiella,* the gem of the entire collection, a near relative of *Gasteropelicus,* is less apt in its flight. Whole schools will leave the water and skeeter along the surface.

After breakfast we rowed up through the 1,000-foot-deep gorge the Potaro has cut through the table-land. The edges of the gorge are carved in a variety of ways that give them the appearance of high mountains. The valley is quite broad, which would indicate great age for the gorge.

The Indians shot a baboon on the way up to the next portage at Waratuk. We camped rather early in the day, above Waratuk, and during the night I had a particularly severe case of chills and fever.

At 8 o'clock on the morning of October 17 we had our first glimpse of the pride of Guiana, the Kaieteur, hidden in mist. We camped shortly afterwards at Tukeit, called by the Indians Tukui, or humming-bird, after the waterfall coming from the plateau opposite. Our hunters killed four peccaries across the river, and the young wild pork was a pleasant change from the canned meat. At Tukeit there is another cataract in the Potaro, and above it several more towards the foot of the fall.

We collected in the Potaro at Tukeit and the following morning started to ascend the plateau. The path leads back from the river for a time, crosses Shrimp Creek, and then ascends very steeply to

the tip of the plateau, where the path is comparatively level again, through the woods, to the edge of the savanna, or treeless tract, immediately about the fall.

After breakfast at the edge of the savanna, Mr. Shideler and myself, William, and another Indian walked over to the edge of the precipice and to the fall, while the rest of the Indians went on to pitch camp and get the boats ready. The scenery about the fall is unique. Looking down the stream, one sees the U-shaped gorge cut by the Potaro in the level plateau. The Potaro is visible from time to time as it crosses from one side of the valley to the other. Only different sections of the upper part of the fall can be seen from the edge of the gorge.

The best view of the fall can be had by climbing down on a ledge of rock at the edge of the precipice. I not only climbed down, but, all excitement with the fever, the steep climb, and the superb view, set up my camera on the ledge and took numerous photographs. I confess to feeling distinctly dizzy when I placed my head under the focusing cloth, knowing that if something should happen I and the camera would land on the rocks a thousand feet below. Not that I could find a finer place to die, but I hesitated to start to kingdom come on such a heavy down grade!

Kaieteur Fall is caused by an excessively hard conglomerate, which overlies a softer sandstone. The savanna above the fall is in large part this naked conglomerate. In places bushes grow from cracks, or bunches of grass, or flowers cling to little accumulations of soil that can be kicked from place to place.

Holmia, which formed our next fishing base, is the trading camp of the Essequibo Exploration Company. It is situated on the Potaro, at the entrance of the Chenepowo River, and contains a store and depot, surrounded by a few Indian huts. My crew of Indians went out at once to collect poison, the root of a plant called "hiari," under the guidance of a local Indian, Jordan. The Indians of the surrounding regions also brought me fishes, and I poisoned a small creek just behind the houses. Unfortunately, it rained heavily, so that the Chenepowo and the Potaro rose many feet and made fishing in these rivers not profitable for some time. We went up the Potaro a distance further and poisoned two creeks just below the Aruataima Cataract. In the cataract iself we could do nothing on account of the high water. William later collected in the cataract and sent me two new genera and three new species, from which it would seem that further collecting at this point would prove profitable.

It seemed that each creek on the plateau we examined contained some one dominant form and a few stragglers, the dominant forms varying in the different creeks.

On our return to Kaieteur we first tried poisoning a little branch above the fall at Waratuk and got some specimens. Then we tried a more ambitious scheme of poisoning a big branch below the fall, as I had found that the poison will drive some fishes out before it kills them. We had three men pound hiari and wash it into the branch of the northern part of the fall. William and another Indian stood a long distance below, after the water had flowed in among and under the rocks. I at first stayed by a pool near where they were poisoning. Soon a depressed little fish came fluttering to the surface. It clings to the rock and looks like one. They were new and I dipped with enthusiasm till I fell in. This broke the ice for me, for I then waded from rock to rock, securing over 70 specimens of the new genus *Lithoxus*. William came with a dip-net full of long, curve-mouthed Gymnotiduls I had not seen.

We poisoned and waded, gathering in all half a bucketful of small fishes, all valuable as specimens. It was rare sport, and I did not realize that it was 10 o'clock and I was played out. We had soup, rice, tea, and jam for breakfast, and started at 11:30 on the home stretch.

Most of the Indians had done nothing but swing in the hammock all the morning, so they paddled with a swish and

Photo by C. H. Eigenmann

SEINING ON THE SANDBAR BELOW THE AMATUK CATARACTS

swing, in great contrast to yesterday's dilly-dallying. At 1 p. m. we were at Erukin, a sandy, clear creek that I wanted poisoned. We had fished here at night with poor success on the way up. William thought it was too big and swift to poison, but I had them stretch the net across the mouth, sent the pounders upstream, and William, some other Indians, and myself took up stations at intervals. I stood in the creek in a patch of sunlight, where every grain of sand could be seen on the bottom. Soon fishes came down the stream in distress, and when the poison was exhausted we found we had a number of novelties in our dip-nets, and the 15-foot net at the mouth of the creek had caught nearly all as they came down.

At 2:30 we were moving again, and when, near 4 o'clock, William cried out "Kangaruma" all paddles stopped for a moment, and then dashed on to land us a few minutes later at the town.

For about a month I had not slept out of hearing of the roar of cataracts. Tumatumari, Kangaruma, Amatuk, Waratuk, Tucui, Kaieteur, and Holmia are all on cataracts or falls. In fact they are all places where goods have to be transported on account of them. I had so much "stuff" that it took more than one trip for the 12 carrying-Indians that had come down with me.

The Potaro Gorge is one of the remarkable features of the world. The river is lined with trees so tall they could only thrive in a region free from strong winds. The sides of the gorge are rugged, and the whole recalls the Rhine or the Yosemite. We saw no one from the time of striking into the woods behind Potaro Landing till we reached Holmia. The entire stretch is utterly uninhabited,

Photo by C. H. Eigenmann

SEINING IN THE OCEAN AT ST. CROIX: BRITISH GUIANA

and very few tourists pass this way to get the inspiring view of fall and gorge from its upper brink. The region between Savannah Landing and Holmia is level, but mountains can be seen in the distance toward the south when the view is not obstructed by trees.

Measurements made by Brown show that the Potaro River 600 feet above the fall is 402 feet wide and 20 and two-tenths feet deep. At the brink of the fall it is 369 feet wide. These measurements are taken at flood. The fall is 741 feet high, and in the 1,020 feet from the kettle below the fall the Potaro has a fall of 81 feet. The brink of the fall is about 1,130 feet above sea-level.

From Tumatumari I boarded the launch, taking with me a negro, Mr. Cummings, with a bateau. We landed at the head of an island a short distance below the mouth of the Potaro and just above Crab Falls, where there was an Indian settlement. We slung our hammocks under the shelter of one of their huts. My own hammock, that of Mr. Cummings, and that of an Indian woman radiated from the same center pole, at the base of which a monkey was tied! Cummings and the Indians went out with the net at night to fish on the sandbanks. I remained in my hammock to recuperate from the fever. On the fifth I sent several of the Indians out to dig hiari roots, while I fished about the rocks of Crab Falls. The Essequibo is very wide at this point, divided by an island, and falls over a dike running square across the river just after it has made a turn.

On the sixth Cummings, myself, and four Indians went with the bateau up the Essequibo to shoot Pacu, the most famous food fish of the colony, at the Warraputa Cataract. Above the Potaro mouth the Essequibo is broken up by a large number of rocky islets, the fragments of a dike crossing the river. Other dikes cross the river further up. the water rushing through the gaps. Through some of the gaps the Indians succeeded in paddling the bateau; through others they dragged the boat, after being driven back several times by the current.

A dike extends across the Essequibo at the mouth of the Konawaruk. Opposite the Konawaruk and below the dike there was a lagoon separated from the river by a sandy and partly wooded spit of land, but connected below with the river. Near the head of the bayou and connected with it by a few inches of water there was a pool toward the river side. It was not more than 50 feet in diameter and perhaps 6 feet deep in its deepest part. Trees overhung it from the river side.

The Indians beat some hiari roots to shreds. They were tied into bundles and the two Indian boys swam through the pool with them. First one species of fish and then another came to the surface, and then they came indiscriminately. A stingaree came fluttering to the surface toward the last, while the little *Corydoras punctatus* withstood the poison to the end. *Catoprion mento*, a Mylinid Characin with a projecting chin, was particularly acceptable. The fish that created the greatest interest was *Mœnkhausia dichrourus*, of which I had seen dozens of "specimens" all the way from Paraguay to Para, and all of them conveyed about as much idea of the appearance of the living fish as a dead and plucked Baltimore oriole would of the living bird. The base of the tail is bright canary yellow, the lobes are crossed with jet-black bands, and the tips are milky white. I do not know how long we stayed here; not over two hours, during which over 40 species were taken out of the pool.

We continued our row to the Warraputa Cataract. The river is divided here into several branches by wooded islands. The two older Indians started out to shoot Pacu, but bagged nothing. The rest of the crew and myself set to work to poison a branch of the cataract, where we were again quite successful, securing a series of specimens that recalled the Amatuk Cataract, and also a series of the young of the Pacu, the first that were obtained or recognized as such. After the poisoning Cummings went to the sandbank to prepare supper, while I with the two young Indians browsed about the dike which causes the cataract. On my return I found that no provision had been made for my hammock, and the Indians refused to go into the bush at night to secure palm branches. I did not like to risk a drenching rain so soon after getting rid of the fever. I insisted that the Indians either build me a shelter or take me back to their camp. Giving them an alternative was a mistake—they decided to take me back. It did not rain that night. It was all very well to come up through the gaps in the dikes in the daytime; it was quite another matter to safely guide the bateau down through them at night. We shot through at a tremendous rate, and once the boat touched something. The boys shouted with glee, while I came to a sober reali-

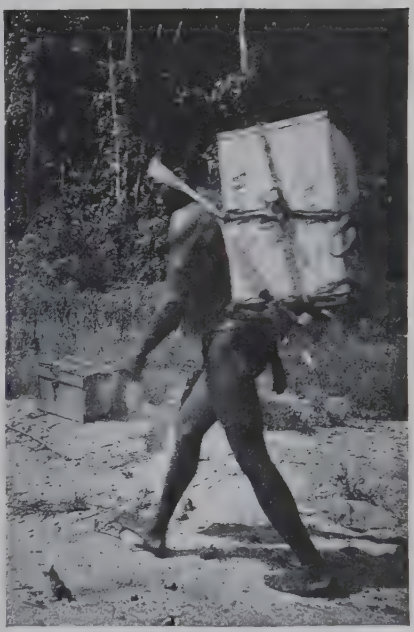


Photo by C. H. Eigenmann

TRANSPORTING OUR GOODS BY THE USUAL METHODS AT KANGARUMA

The load is limited to 60 pounds per man, and the package must not exceed certain dimensions.

zation that it would have been better to trust the sky than the rapids. But we came safely back to the huts early in the evening.

On the seventh of November I collected about the rocks just above Crab Falls. Here I succeeded again in getting fishes with hiari that could have been secured in no other way. At one point the bank is piled with huge blocks of stone. To dislodge the fishes from between them would have been impossible in any ordinary way. We pounded some hiari roots and washed them into the swift current that was flowing towards the rocks. At once some species came to the surface, straight up without attempt to escape. Several species were dislodged, including an electric eel. We repeatedly got it into our dipnet and it as often got out again, without, however, making any co-ordinated movement to escape from the reach of the net. It proved too slippery, however, and got away. When the boat came by from Tumatumari we loaded my effects into it and I left the region of the Potaro and upper Essequibo.

# PECULIAR CAVES OF ASIA MINOR

By Elizabeth H. Brewer

*With Photos by the Author*

FEW travelers have visited the Troglodyte dwellings of Asia Minor, not because they are lacking in interest, but because traveling in that country is not easy. There are two or three short railroads near the coast, and one from Constantinople to Konieh (the ancient Iconium), a road which will ultimately extend to Bagdad. But if you wish to see the interior of the country, it must be either on horseback or by carriage. There are several fair wagon roads, but often you must mount your horse, climb mountains, ford rivers, and wander through forests. Many times the path is discernible only a few steps in advance. Another inconvenience of travel is the necessity of taking all things needful for man and beast—such things as bed and bedding, cooking utensils, and food.

A few summers ago I was in Everek, a large town at the foot of Mt. Argæus and about 150 miles from the Mediterranean Sea, near Tarsus. To the south of Argæus is a wide plain, opening from which toward the west run several narrow valleys. Two of these, Soghanli Dere (valley) and Urgub Dere, have many traces of the early or earliest inhabitants. I had planned to visit the former valley, but my foreign escort failed; and, the region not being very safe, I decided to go to the better-known valley of Urgub.

It was something of an undertaking to go on a four days' trip away from regular lines of travel with only a young Armenian teacher and his father; but as there were no other obstacles in the way, I went. Although it was past the middle of September, the sun at noonday was very hot. Therefore we started soon after 5 a. m., and rode through the narrow, stony streets of Everek, then around the base of Mt. Argæus (Erjias Dagh). The grand old mountain towered high into the air, the highest point in Asia Minor (13,100 feet). The summer sun had melted all the snow on its southern side, so only bare rocks remained. The ascent did not look very steep, yet I was told by one familiar with Alpine climbing that this is more difficult than that.

Our little caravan had somewhat increased, and consisted of my young guide and his father, large men mounted on little donkeys; another Armenian and his son, and a Turk, these three taking

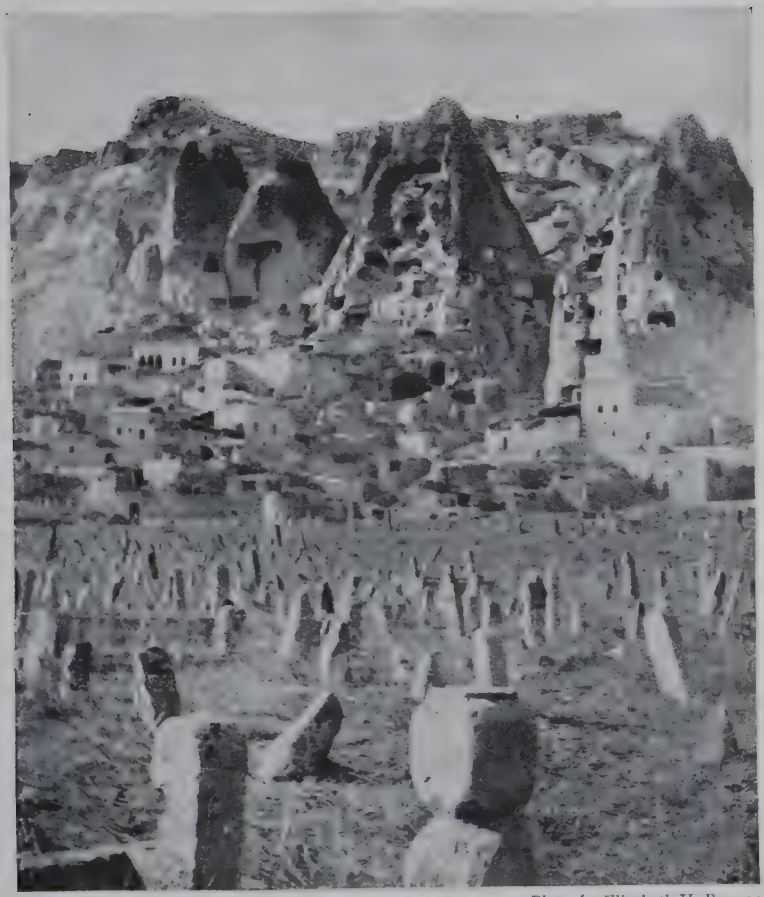


Photo by Elizabeth H. Brewer

CONE FOREST NEAR GARIN: TURKISH CEMETERY

advantage of our trip to go to Urgub; the muleteer, and a donkey with my load. There is always danger of robbers, and people do not like to travel alone. Hence news of any one making a journey is soon spread and others join the party.

Trees are rare on these plains and one gladly welcomes them; so when after five hours we came to a tree, we rested under its shade for lunch. Near us were rude tents, the homes of shepherds who watched their flocks.

We, or rather I, was a great curiosity. Foreigners, or even natives in European dress, are uncommon, and a woman who rode a side saddle was strange, indeed. The people asked, "Does she have only one leg?" As we sat on the stones eating, men, women, and children crowded around to watch the process in every little detail.

The ride across the plain was long. There is almost no vegetation, the soil is very salty, and reflected the hot sun. In the distance the effect was like a large lake; the mirage was so perfect that only as we approached could we realize that these were barren sands. I have never

Photo by Elizabeth H. Brewer

PIGEON CONE NEAR ÜRGÜB

seen the desert, yet I fancy this was not unlike it, only smaller in extent. Because the plain seems to lengthen as one goes, it is called by the Turkish word "Yuvash, yuvash" (slow, slow).

Late in the afternoon we left the plain and entered a narrow valley, up over stony, uneven paths to a high ridge, where below us, on the other side, was the little village which was to be our first stopping place. It was quite dark when we entered, so we attracted little attention. The father, who was well acquainted here, had said we should find comfortable rooms. Imagine my dismay when we were taken to a room, large enough, it is true, but dark and gloomy, with little air, and which would have to serve the three of us. I viewed the room from all points inside, and also from the outside; there was no chance for privacy and no other place near safe enough for me.

After our tea and calls from various people, we looked at other houses and found one with a wide porch having three arches. This opened on the road, but was too high for any one to get in or easily see in. The curtain which I always carried, and is, by the way, an essential in traveling, was hung from one pillar to the house and made me a little room at the further end, my companions having the rest of the porch. There was plenty of fresh air, the night was comfortable, and I was perfectly safe.

We were to make an early start, so I got up in the dark hours. One of the men made a fire and prepared coffee. After that, however, we went back to sleep, and it was at least two hours later before all were ready These people live by the sun, and the muleteers could not be induced to start until daylight was fully upon us. The morning was beautiful. Our way wound along through the fertile Urgub Valley. It is narrow, with a stream flowing through it; the hillsides were covered with vineyards full of luxuriant fruit. Occasionally we bought a watermelon or two (small as muskmelons) for our refreshment. As we rode along in the sweet morning air all nature was charming.

Soon my attention was attracted by a strange rock formation. The rock seemed to be worn away in places, leaving a series of cones very white and glistening. These were on both sides of the valley. Sometimes they were entirely free from the rest of the rock and looked like a forest. They varied greatly in size, from 10 to 40 or 50 feet in height. Many had openings and seemed intended for dwellings. My curiosity was aroused, but we could not now tarry.

As we entered Urgub toward noon we passed a large irregular cone, 100 or 200 feet high, with many windows. It stood by itself and interested us at once. I took a photograph and later intended to explore it, but was told that now it is only a home for pigeons and cannot be visited.

The sun had grown very hot, the glare from the white houses was trying, and I appreciated the hospitality of friends. While I rested my companions went in search of a guide.

We were disappointed to find that this

Photo by Elizabeth H. Brewer

SHEPHERD AND DOGS

Photo by Elizabeth H. Brewer

WOMEN AT BOSCHKENT

"Don't scold us; don't drive us away. We only want to look"

Photo by Elizabeth H. Brewer

LARGE PYRAMIDS IN GARIN

town with so many rock houses had little of real interest, and that we had come all this way for nothing. Urgub is built on a side hill and many houses are cut into the rock, but the places which looked most attractive belonged only to Moslems and we could not gain entrance.

Our first thought was to rest a few hours and then return to the place where we had seen the cones, but after talking with some of the Protestant Greeks we decided to hold a service that evening and leave early the next morning. Had there been one more day for our trip we should have driven to Martchan, a few miles away, and seen a rock church and other cones which towered in the distance.

We wandered about the town and called on one of the Greek Protestants. Word of the meeting was sent around, and some 30 or 40 gathered in that upper room eager to hear the words of life. Men with faces worn by care and toil, mothers with little ones in their arms, children attentively listening. My young companion translated, for we spoke different languages; but we had met to worship the same God and strengthen our mutual faith. Almost every one waited to shake hands and to thank heartily.

True to their promise, the muleteers were on hand, and before day had fairly come we were off. In many places on the hillsides I saw dark patches. After puzzling for some time, I asked what caused the peculiar soil. "Oh, those are masses of grapes spread out to dry," was the answer.

At last we came back to my cone forest. One or two hundred cones were clustered together. We entered several and found a similar plan in each. One large room about 10 feet high cut out in the rock. There were a window, a fireplace, and shelves cut in the sides. The stone was soft and the heat of fires had melted it sufficiently to form a glaze over the interior surface. Some of the cones were connected, so that we could go through the doors from one dwelling to another. In a few, windows were up quite high.

Weird indeed it was to be wandering through this desolate city, this city of the past. When and by whom were these houses made? I eagerly scanned the walls inside and out, but here there was nothing, not a word or a mark to betray the ancient inhabitants. Far back in history mention is made of people who lived in caves, as in Obadiah, "The pride of thy heart hath deceived thee, thou that dwellest in the clefts of the rock, whose habitation is high," but we have no idea of these strange dwellers.

Professor Sterrett, of Cornell University, who visited this region and examined the cones fully, comes to the conclusion that "the cones of Cappadocia were well known and inhabited in the dim distant Hittite period, at about 1900 B. C., a date beyond which we cannot go and need not try to go."

This is a volcanic region and the layers of rock are of different degrees of hardness. During the centuries the softer material has worn away, leaving, as Professor Sterrett says, "tens of thousands of more or less isolated cones and cone pyramids. It is known that a chamber 25 feet long, 13 feet broad, and 10 feet high was excavated by a single workman in 30 days."

A half hour further brought us to the little village of Garin; the houses were mostly cones, two being especially large and fine looking. We counted 10 or 12 tiers of windows. I was extremely anxious to enter these dwellings, but this was a Moslem village, and we attracted so much attention that my companions were absolutely unwilling to have me tarry at all. We crossed the valley and passed one or two large isolated cones, of which I took photographs. They were evidently used for storehouses.

About noon we reached Boshkeni (head village), where we had passed the first night. It was daylight now and people came in crowds to see the strange sight. I sat on the porch, sheltered from too near approach, but on a little rise of ground in front the women and children gathered. I ate my lunch, arranged my hair, and washed my hands, to the great astonishment of the watchers. One of my companions came in at that moment and was about to speak to the women. "Don't scold us," they said; "don't drive us away; we only want to look." For once I felt like Barnum's greatest show, but I did not object to their looking and took the opportunity myself to snap as many of them as possible with my camera.

It was just at the season of wheat harvest, and many large threshing-floors were crowded together near the village. In one place the oxen were treading out the wheat; in another a man or a woman was tossing it into the air to let the wind carry away the chaff, and in still another place some were putting the good grain into bags. A high wind so completely covered us with chaff that we were obliged to wait until the shower had stopped.

From here we retraced our steps toward Everek; up the hill, then down, down again to the valley.

As we rested by the way two Circassians passed us. I had heard so many stories of Circassians that, although assured these men were friendly, I was glad when they were gone. It was almost dark when we encamped for the night in one of the many sheepfolds on the edge of the plain. Stones were piled at the entrance so that we could not easily be disturbed. My bed was spread near the wall, with my good horse, Charlemagne, not far away, and there under the light of the stars, with this strange company, the night passed. Before daybreak we were crossing the salt plain, and by noon, hot, tired, and sleepy, we gladly welcomed the shelter of friends at Everek.

## THE SPEEDIEST BOAT

THROUGH the courtesy of Dr. Alexander Graham Bell and Mr. F. W. Baldwin, the NATIONAL GEOGRAPHIC MAGAZINE publishes illustrations on pages 876-877 of perhaps the most unusual craft afloat, the hydroplane boat of Mr. Forlanini. In this motorboat Dr. Bell recently traveled 45 miles an hour on Lake Maggiore, Italy.

The new Italian hydroplane is described by its inventor, Enrico Forlanini, of Milan, as follows:*

"The apparatus has been patented under the name of appareccio idrovolante (apparatus for hydroplaning). It constitutes true hydraulic flight, the apparatus being sustained by the water in the same manner that birds and aëroplanes are sustained in the air; that is to say, by the dynamic reaction of the water on the superfices or planes attached to the hull of the hydroplanes, most of these planes remaining completely out of the water while the machine is in action.

"The idea of using the dynamic reaction of the water is not new, but up to

* Quoted from the New York *Evening Post.*

THE HYDROPLANE BOAT OF SIGNOR FORLANINI TRAVELING ON LAKE MAGGIORE, ITALY, AT A SPEED OF 45 MILES AN HOUR

Photo by F. W. Baldwin

LOOKING DOWN ON THE HYDROPLANE BOAT OF SIGNOR FORLANINI

The hydroplane has just been taken out of the boathouse, and the hydro-surfaces have not yet been turned down into the water. The men in the hydroplane are Mr. Forlanini (amidships), and in the stern Dr. Soldati and a mechanic.

the present has not been applied with success except what has been attempted with gliding boats. In these boats, however, the hull does not leave the water, but skims on the surface, which hinders the attainment of really high speeds.

"The most important characteristic of the hydroplane is that the resistance of the water is not dependent on the speed, but remains constant, and is equal to half the total weight of the apparatus; the total resistance is increased only by a portion of resistance due to the air, a portion naturally proportional to the square of the speed. In consequence, similar hydroplanes in the future should be able to attain speeds of 60 to 100 miles an hour and change themselves into flying machines by the addition of the necessary planes for aërial suspension."

* * * * * *

After six years of experimenting, Forlanini can now consider that he has arrived at fully satisfactory and definite results, says the *Scientific American*. The first hydroplane he tried, during the years 1905 and 1907, immediately demonstrated the excellence of the new system, but its performances were always handicapped by the irregular working of a bad 70-horsepower motor with which it was fitted. Another hydroplane, tried during the years 1908 and 1909, was fitted with a steam motor that worked more regularly. Although the effective power was only 25 horsepower and the weight of the boat over a ton, this machine attained a speed of over 50 kilometers an hour.

The hydroplane that is being tested at present weighs two tons when there are two persons aboard—it is possible to carry four other persons—and it is fitted with a 100-horsepower gasolene motor. It has attained a speed of 45 miles an hour, and this speed will be increased by the introduction of a few modifications that are being gradually indicated during the trials it is now undergoing. This hydroplane has a hull 32.8 feet long; at the bows and stern are two strong steel tubes transversely. At the four free ends of these tubes—namely, on the starboard and port sides of the boat—is fixed a sort of framework, which contains a series of planes, one above the other. These superfices of planes are made of high-resistance steel, the workmanship being very accurate, and their size decreases from the top to the bottom.

When the hydroplane is not working, but is floating on the water like any other ordinary boat, the planes are immersed in the water, and have a slight horizontal inclination. As soon as the hydroplane, owing to the working of the screw, begins to move forward, the water exercises a vertical force on the planes in precisely the same manner as the air on the planes of an aëroplane. The hull therefore tends to rise and so diminish its immersion and, naturally, the resistance against its motion in a manner that the speed is able to increase.

In this way there comes a moment when the hull is completely out of the water. At this point the speed rapidly increases, and little by little the various planes or superfices rise out of the water one after the other. When the maximum speed is reached only the bottom planes remain on the water, while the bottom of the hull is 65 centimeters higher.

The propeller by which this strange craft is driven is carried on a hollow fin, which may be seen amidships, the short propeller shaft being revolved by bevel gears attached to a vertical intermediate shaft, driven direct off the motor.

## IMPORTANT CORRECTION

ON page 603 of the July, 1911, issue the credit line under the illustration of the diplodocus was erroneously given as "the late" Charles R. Knight. Mr. Knight, the well-known artist-naturalist, whose paintings and models of birds, animals, and fossil creatures for the United States government, the Carnegie Institute, and the American Museum of Natural History have distinguished him in his profession, resides at Lawrence Park, Bronxville, N. Y.

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THE NATIONAL GEOGRAPHIC MAGAZINE

# NEW PLANT IMMIGRANTS*

BY DAVID FAIRCHILD

AGRICULTURAL EXPLORER IN CHARGE OF FOREIGN SEED AND PLANT INTRODUCTION, UNITED STATES DEPARTMENT OF AGRICULTURE

TO READERS of the NATIONAL GEOGRAPHIC MAGAZINE who have wandered with men of many tastes all over the world, the thought must often have come, "Of what use are all the strange plants which make up the landscapes of the pictures?" The globe, with its kaleidoscopic panorama of people, animals, and plants, has been whirled before you, as it were, and you have in your minds the picture of a ball circling through space, covered with a film of plants, animals, and men in constant change. So varied is this film of plants that there are probably half a million distinct, specific forms in it, and yet man uses only a few hundreds for his own purposes.

To change, in a measure, the distribution of the really useful plants of the world is what the office of Foreign Seed and Plant Introduction of the Department of Agriculture is trying to do. The motive underlying this work might be called the ambition to make the world more habitable. If one is inclined to be pessimistic with regard to the food supply of the world, he has only to talk to any one of the enthusiasts of the Department of Agriculture to get a picture of the widening vista of agricultural possibilities which would make him realize that the food problems of the race are not hung in the balance of our Great Plains area, and that the food-producing power of the world is still practically unknown, because we have just begun to study in a modern way the relative performance of different plants.

We may not always grow the plants we do now. Some of them are expensive food producers, some produce foods that are difficult to digest, and some we may leave behind as we learn to like others better.

What to grow was not so serious a question to the early Phœnician peasant, who knew perhaps a dozen crops, as it is becoming to the American agriculturist, who can pick from the crops of all the world the one best suited to his land and climate. Changes come so rapidly nowadays that if a man today talks of "pears" he may mean what are ordinarily thought of as pears, or he may refer to alligator pears which he is growing in Florida, or prickly pears which he is cultivating in Texas. Both the alligator pear and the prickly pear have come in as crops to be reckoned with within

* See also "Our Plant Immigrants," by David Fairchild, NATIONAL GEOGRAPHIC MAGAZINE, April, 1906.

Photo by P. H. Dorsett

THE SANDERSHAW MANGO OF INDIA FRUITING IN FLORIDA

A six-year-old tree of this variety, which was introduced by the Department, bore sixty fruits at Miami, and these were submitted to the fancy fruit dealers of New York and other large cities, who declared that they could dispose of any quantity of such fruits at the fanciest prices. Three hundred dozen fruits of the Mulgoba, another East Indian introduction of the Department, sold last year at three dollars a dozen (see text, page 889).

Photo by G. N. Collins

A MANGO TREE IN FULL FRUIT

The mango is one of the most important fruits in the world. In India it is so valuable as to be held sacred, and to deserve annual ceremonies and celebrations. Full-sized trees grow to 70 feet in height, and have been known to produce in India as much as $150 worth of fruit in a single season.

Photo by G. N. Collins

A SEEDLING MANGO TREE IN FULL BEARING

The fruits of many of the seedlings are so strongly flavored with turpentine that their sale in America has given people an idea that the mango is little more than a ball of tow soaked in turpentine. There are 500 varieties of grafted mangos in India, however, some of which rank among the most delicious fruits in the world. Some weigh as much as 6 pounds, are entirely free from fibres, and are produced in quantity. Trainloads of them are shipped to the large cities of India.

Photo by Crandall

NEW MANGO PLANTS AS THEY ARRIVED FROM BOMBAY

In India the mango is propagated by an expensive method of inarching, and the only way we have been able to get the plants for trial in Florida has been by importing the plants in pots. A Florida nurseryman, Mr. Cellon, of Miami, first learned how to bud the mango, and finds it almost as easy to bud as the peach. This is a great step in advance, and will make the distribution of the fine varieties an easy matter. This method of propagation is now being successfully practiced by Mr. Edward Simmonds at our Plant Introduction Garden at Miami, Florida.

the past 15 years, and already the stock-raisers of the South are wondering if they should plant spiny or spineless forms of the prickly pear cactus, and the fruit-growers of Florida are inquiring as to which of the several varieties of alligator pear tree is going to be the most productive and profitable.

To help find the plant which will produce the best results of any that can be grown, on every acre of land in the United States, is, in general, the broad policy of the Office of Seed and Plant Introduction of the Bureau of Plant Industry.

Although begun in a systematic way and as a distinct activity of the Department in 1897, it has barely touched the fringe of its possibilities. The 31,000 different plant immigrants which have come in, and have either died or are now growing somewhere in this country, represent a small beginning only, and have merely helped to show the great-

Photo by Frank N. Meyer

A NEW BAMBOO GROVE IN THE CAUCASUS, ESTABLISHED RECENTLY BY THE RUSSIAN GOVERNMENT

The Russians have foreseen the great commercial possibilities of the timber bamboos of the Orient, and have started a grove of considerable size at Chakva in the Caucasus, which experiment is a success, according to the investigations of Mr. Frank N. Meyer, our Agricultural Explorer. New methods of steaming the bamboo poles under pressure have been devised, and a demand far exceeding the supply has sprung up for the cheap irrigating pipes, telegraph poles, scaffolding material, ladders, and furniture which are made from the timber already cut from the grove (see text, page 904).

ness of the possibilities which progress in agricultural research is creating.

"You will soon have all the crops in," is the remark of those who have given the matter little thought. Our own lives change with every moment of time, and so do the lives of plants. The strains of potato which our grandfathers grew are, with few exception, different from the strains in vogue today; and, fitting their lives into the various conditions of soil and climate, the original wild South American species of potato, *Solanum tuberosum*, assumes in the hands of men a thousand different forms.

In whatever parts of the world new forms may spring into existence it matters not; our potato-growers should be able to try every sport of importance and every wild, hardy species, whether it comes from the manse of a Scottish parson, is discovered as a wild species along the Paraguay River by an American railway bridge-builder, is found among the mountains of Colombia by a Jesuit priest, is gathered by a forest ranger in

Photo by Frank N. Meyer

BAMBOO TIMBER AS IT IS RAFTED DOWN THE TRIBUTARIES OF THE YANG-TSE RIVER

It is difficult to give an adequate idea of the magnitude of the bamboo timber business of China and Japan, because it is scattered throughout the country, and every farmer has his own little grove, from which he cuts irrigation pipes, timbers for his house and shingles for his roof, and from which he makes all sorts of useful articles for his household.

the dry regions of an Indian reservation in New Mexico, or is secured by a trained collector from the Chiloe Islands off the coast of Chile. It makes little difference; they must all come in as plant immigrants to show what they can do in the gardens of American experts. There is always the chance that they may be thrown out as unprofitable; but, if they have desirable characters, they can be blended with others, or exploited with others, if they are superior for any of the potato regions of this country.

It may be new to many that every day plant immigrants from different parts of the world arrive in Washington, and every day, through the mails, hundreds of these disinfected arrivals go out to find a new home in some part of the country.

It is a difficult matter to give an adequate impression of the magnitude and importance to the country of this stream of new plant immigrants which for 14 years has been pouring into the country, and has been directed by a great and growing body of research men and women into those regions where it was thought they might make their homes.

In the brief space of a short article, and to avoid what would be almost a bare enumeration of plant names, I pre-

Photo by P. H. Dorsett

THE TEVIS BAMBOO GROVE OF BAKERSFIELD, CALIFORNIA

This is the first grove of any size to be established in America. Mr. William Tevis, of San Francisco, the owner, bought a single plant of the "Giant Japanese Bamboo" from a Japanese nurseryman in San Francisco about twelve years ago, and from this single plant has grown a grove which is so strikingly beautiful that those who have seen it declare it to be one of the most fascinating things in the country. The graceful, plume-like stems rise over fifty feet in the air, and cast an enchanting shade on the carpet of brown dead leaves below.

Photo by Frank N. Meyer

BAMBOO WARES AS THEY ARE OFFERED FOR SALE IN CHINESE VILLAGES

No material is to be compared with the bamboo for the construction of this kind of work. It can be split into strands no larger than a horsehair, and from the same shoot can be made broad bands and hard, rigid framing pieces. The most delicate baskets in the world are made of bamboo, and at the same time the coarsest, roughest weirs, to be filled with stones and rolled into the streams for holding embankments.

fer to treat of only a few of the many important problems with which the office is working, passing by, also, the introduction of the Durum wheat, the Japanese rice, and giving the Siberian alfalfas, which are earning for the farmers of the country many millions of dollars a year, a bare mention, for the reason that they have been so often described in the magazines and daily papers.

The mango is one of the really great fruits of the world. India, with its hundreds of millions of people, has for centuries held it sacred, and celebrates annual ceremonies in its honor. The great Mogul Akbar, who reigned in the 16th century, planted the famous Lak Bag, an orchard of a hundred thousand mangos, and some of these still remain alive. It is a fruit the importance of which Americans are at last beginning to recognize, notwithstanding the unfortunate discredit which the worthless seedling mangos of the West Indies have given it in the minds of Americans generally.

There are probably more varieties of mangos than there are of peaches. I have heard of one collection of 500 different sorts in India. There are exquisitely flavored varieties no larger than a

Photo by Crandall

LIVING PLANTS OF THE INDIAN BAMBOO, FROM WHICH THE SPLIT BAMBOO FISHING POLES ARE MADE, AS THEY ARRIVED AT THE DEPARTMENT OF AGRICULTURE

As there are many species of bamboo which produce seed only once in 40 years, the only way to get them into this country is by means of special shipping cases, called Wardian cases, which are in effect miniature greenhouses, in which the plants are permitted to grow during the voyage, being watered on the way.

plum, and there are delicious sorts the fruits of which are six pounds in weight. In India, where the wage of a coolie is not over 10 cents a day, there are varieties which sell for $6.60 a hundred, and the commonest sorts bring over a cent apiece.

The great mango trees of India are said to reach a height of 70 feet, and are so loaded down with fruit that over $150 worth has been sold from a single tree.

These fine varieties, practically as free from fiber as a freestone peach, can be eaten with a spoon as easily as a cantaloupe. Train-loads of these are shipped from the mango-growing centers of India and distributed in the densely peopled cities of that great semi-tropical empire; and yet, notwithstanding the great importance of this fruit, the agricultural study of it from the new standpoint has scarcely been begun. I believe that it has never, for example, been tested on any but its own roots.

Photo by Frank N. Meyer

THE CHILDREN ARE HOLDING SHOOTS OF TWO SPECIES OF EDIBLE BAMBOO

Bamboo shoots form one of the favorite vegetables of the Chinese, and the cultivation, both in China and Japan, of the species which yield the edible shoots is a lucrative business, in which large amounts of capital are invested. To the Oriental the edible bamboo is more important than asparagus; in fact, while we are introducing into America the bamboo, the Japanese and Chinese are introducing the asparagus into their countries.

We have gathered together in Florida and Porto Rico and Hawaii more than a hundred varieties, and some which we have fruited have already attracted the attention of the fancy fruit-dealers, who agree that the demand for these will increase as fast as the supply can be created, and maintain that extravagant prices, such as 50 or even 75 cents apiece, will be paid for the large, showy, delicious fruits. Last year 300 dozen Mulgoba mangos were sold in Florida for $2 a dozen. The Governor of Porto Rico has committed himself to a policy which, if carried out, will cover the island with hundreds of thousands of mango trees of the better varieties.

One of the oldest cultivated plants in the world is the date palm. At least 4,000 years ago it was growing on the banks of the Euphrates, and it is this plant and the camel that together made it possible for the Arabs to populate the great deserts of northern Africa and Asia. The date palms would grow where the water was alkaline, and the camels were able to make long journeys across the desert to take the dates to the coast to market and sell them for wheat and olives.

In these deserts of the old world, millions of Arabs live on dates, for the date palm can be cultivated on land so salty as to prevent the culture of any other

Photo by P. H. Dorsett

THE FIRST GOVERNMENT GROVE OF TIMBER AND EDIBLE BAMBOO, ESTABLISHED IN A CLEARING ON THE RICH LANDS OF NORTHERN FLORIDA

In the Orient the commercial groves of bamboo stretch for miles along the streams, and, aside from the fact that they are lucrative investments, they form the most enchantingly beautiful landscape effects. It is with the object of creating a sufficiently large grove of these plants for the commercially inventive minds of Americans to work upon that this planting at Brooksville, Florida, has been made.

Photo by P. H. Dorsett

A BAMBOO WINDBREAK AT THE PLANT-INTRODUCTION GARDEN AT BROWNSVILLE, TEXAS

Protection from the northers is afforded in south Texas by any dense, bushy growth, but it has been difficult to find the right plant to form such a growth. Such a plant has been discovered in a drought-resistant species of bamboo from Bengal. This forms an impenetrable hedge, and makes it possible to grow certain plants which need protection from the cold, drying winds of winter.

paying crop, and it will live in the hottest regions on the face of the globe; not even a temperature of 125 degrees F. will affect it. This obliging plant does not, however, insist on such temperatures, but will stand some frost, and has been known to live where the mercury falls to 12 degrees F.

It is also the only wood obtainable in the oases of the Sahara, and on the shores of Arabia boats are made of it.

The date palm has both male and female flowers and they occur on separate plants, and the Arabs have to plant one male for every plantation of a hundred females, making a harem as it were. The artificial pollination or fertilization of the female palms is one of the most interesting processes practiced with plants, a spray of flowers from a male palm being bound with a bit of palm-leaf fiber in each inflorescence of the female tree. Propagation of the date palm can be accomplished by means of seeds, or suckers, which are thrown up at the base of the palm. Suckers will start, however, on land so salty that the seeds refuse to grown on it.

Four years from seed, trees of some varieties begin to bear and in six years will have paying crops of dates. They live to a much greater age than almost any other of the fruit trees, and specimens a century old are said to be still a good investment.

Photo by David Fairchild

AN ARAB IRRIGATING HIS DATE PALMS IN BAGDAD

Four thousand years ago his ancestors watered their date palms along the banks of the Tigris. The introduction of this oldest of cultivated crops into America will remain as a historical event after generations of Americans have come and gone.

The date is not a dry-land crop, but requires irrigation to grow and produce fruit. A plantation once established requires to be kept free of weeds, to be pollinated when the palms come into bloom, and to have the fruit harvested when ripe. Of insect pests we know too little as yet, though the prospective planter should count this in his estimate of expense; remembering, however, that modern scientific methods have overcome the greatest fruit pests, and that these on the palm are not different in general character from those which are now under complete control.

Very little pruning of the palms is necessary, and the harvesting is very simple, since the dates grow in great bunches, which often weigh from 20 to 40 pounds apiece.

There are over a hundred varieties of dates now growing in the government gardens in California and Arizona, from

Photo by Crandall

PLANT IMMIGRANTS FROM BAGDAD AS THEY ARRIVED IN WASHINGTON

Suckers of Arabian date palms received three years ago from Consul Maggleson, which are now growing and will fruit in a year or two in the desert region of the Southwest

Photo by P. H. Dorsett

THE TUNG OIL TREE OF CHINA AT THE FOOT OF MOUNT RUBIDO, RIVERSIDE, CALIFORNIA

Photo by David Fairchild

AN ARAB IN EGYPT CLIMBING A DATE PALM FOR THE PURPOSE OF FERTILIZING THE FLOWERS TO INSURE A CROP OF FRUIT

This four-year-old tree produced 50 fruits, and indicates the possibility of its cultivation in America. The tung oil, which is made from the seeds of this tree, is considered by paint manufacturers as the best drying oil known, and immense quantities are shipped down the Yang-Tse-Kiang and through the Suez Canal to New York.

Photo by P. H. Dorsett

A BUNCH OF DATES RIPENING IN THE DESERT REGION OF SOUTHERN CALIFORNIA

There are few fruit crops which present a more beautiful show than the date, for it has its golden yellow or brilliant red fruits all gathered together in great clusters, as though harvested and in baskets.

Photo by David Fairchild

LOOKING FOR THE RIPE DATES

This is possibly the first time in history that an American child has had the experience of hunting in America for ripe dates in the orchard of date palms about the house. Many thousands of children will have this experience before this one is a grown woman.

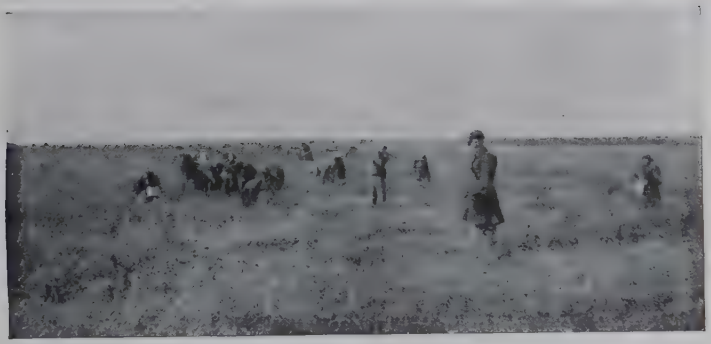


Photo by N. E. Hansen

RUSSIAN PEASANTS GATHERING SEEDS OF THE WILD ALFALFA NEAR THE EDGE OF THE GOBI DESERT FOR THE AGRICULTURAL EXPLORER, N. E. HANSEN

This is the yellow-flowered *Medicago falcata*, the hardiest of the alfalfas; destined, it is believed, to make its home on our northwestern ranges, or when bred with the ordinary alfalfa to render it proof against the severest drought and the most intense cold which visits the northwest.

Photo by David Fairchild

A 15-ACRE OASIS OF DATE PALMS IN CALIFORNIA

This plantation was started by the government six years ago, and into it were gathered the best dates of the world. Most of them fruited this summer and attracted thousands of visitors.

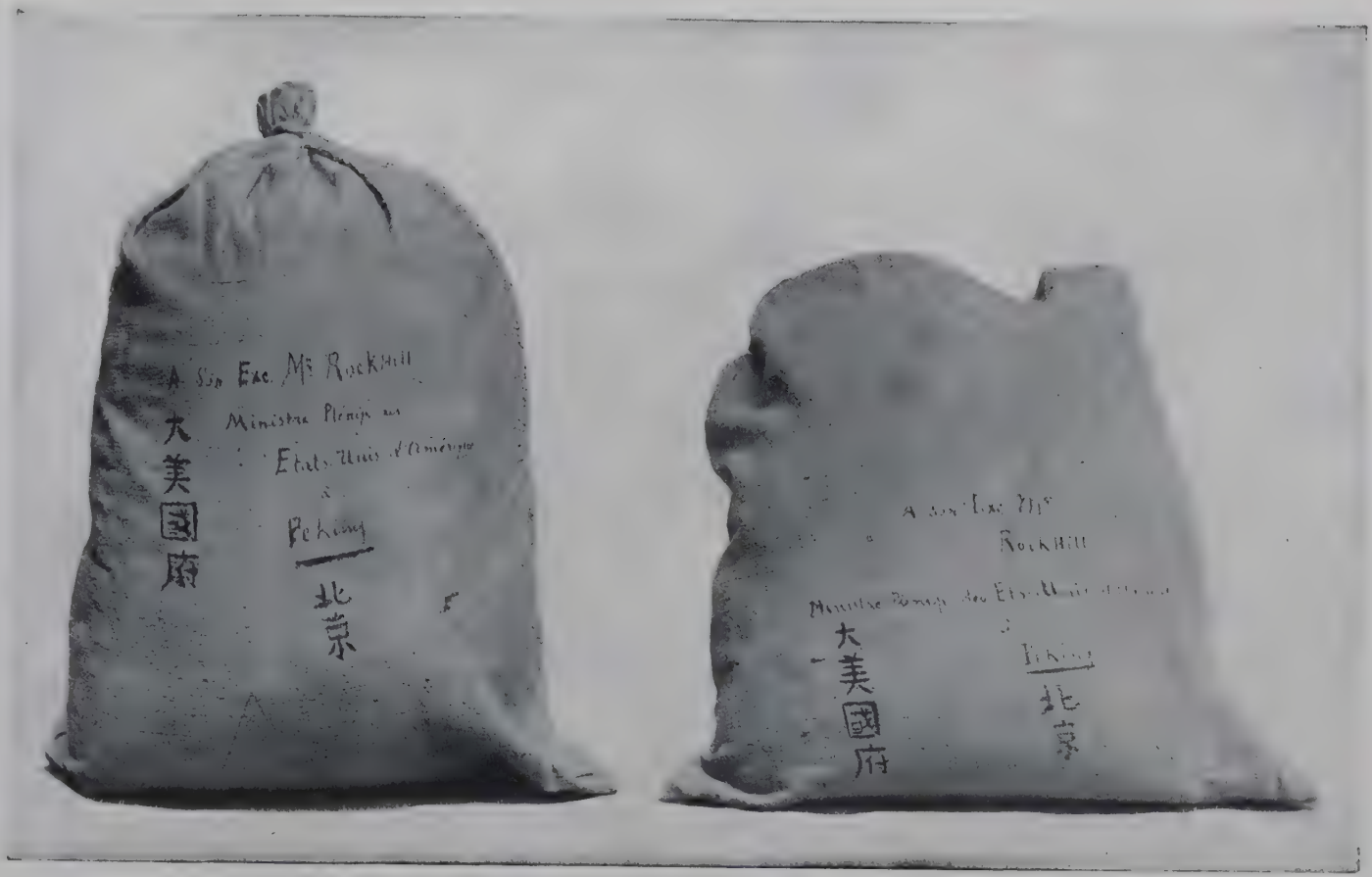



Photo by Crandall

TWO SACKS OF ALFALFA SEED OBTAINED BY AMBASSADOR ROCKHILL FROM A JESUIT MISSIONARY OF HIS ACQUAINTANCE LIVING IN MONGOLIA: THIS IS A DESERT FORM, WHICH IS NOW BEING EXPERIMENTED WITH IN THE SOUTHWEST

Photo by Westgate

Although alfalfa was brought by the Persians into Greece 490 B. C., there was scarcely an acre in this country sixty years ago. Today it is considered the best rough forage known, and there are over 7,500,000 acres of it in the Western Hemisphere. The search for hardier, drought-resistant, winter-growing, better-stooling, heavier-yielding varieties has taken explorers all over the world, and this search has attracted the attention of millions of people. As a result there are now in the Great Plains region breeding plots like the above, where are gathered together for the purpose of cross-breeding and selection the principal alfalfas of the world. The creation of entirely new forms, combining new characteristics, has already begun, and the effects will be as surely felt by this gigantic industry as good mining has felt the discovery of the cyanide process.

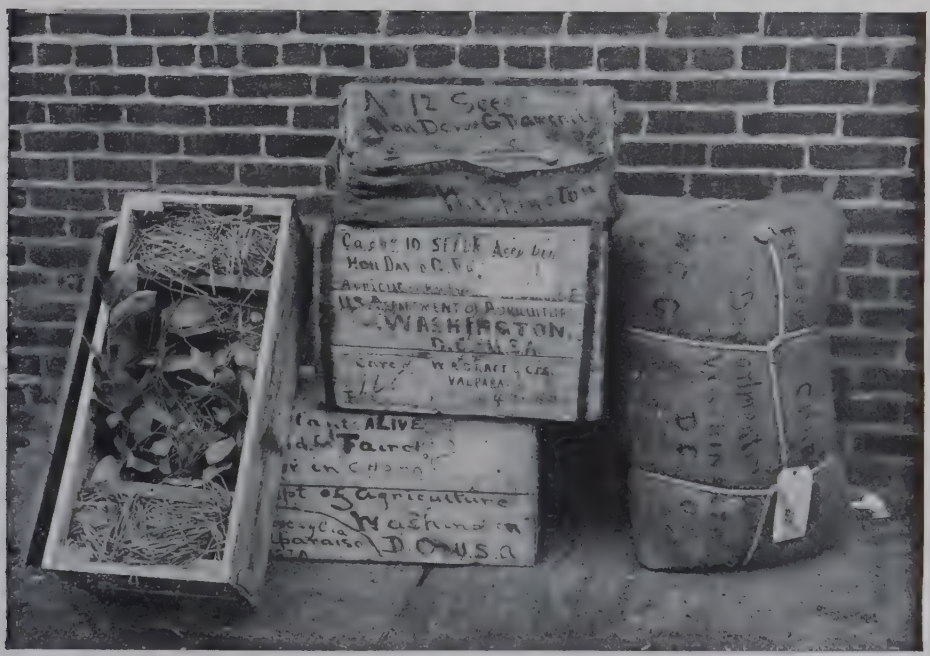



Photo by Crandall

NEW PLANT IMMIGRANTS ARRIVING AT THE DEPARTMENT OF AGRICULTURE

A shipment of living plants and seeds from the Cordilleras of Chile, which is being opened preparatory to inspection by an entomologist and plant pathologist for the presence of dangerous plant diseases or insect pests. These plants are either growing now in some part of the United States or have been discarded by some specialist who, after having tested them, has decided that they are not yet on the program.

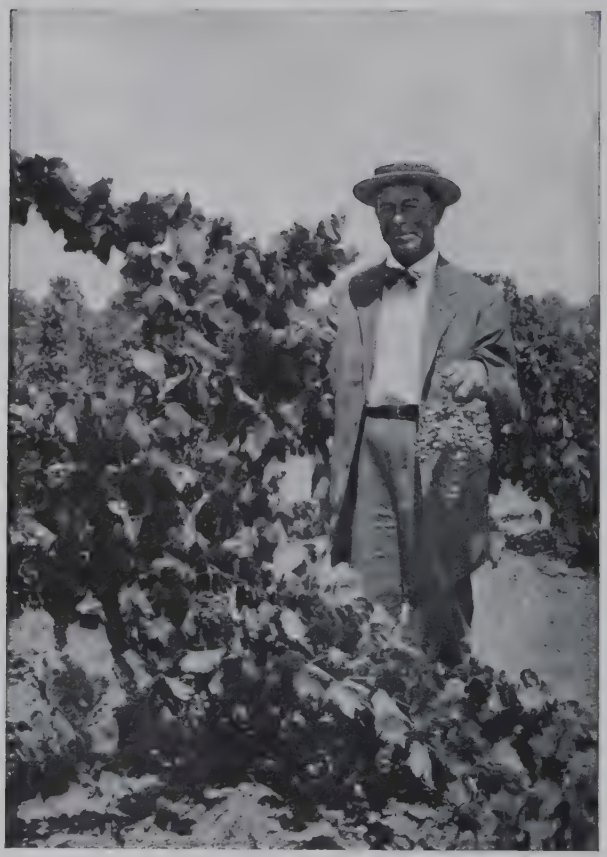


Photo by David Fairchild

We are so used to finding seeds in grapes that we do not realize how imperfect the grape is as a fruit until we eat seedless ones. This variety, the *Sultanina rosea,* was discovered near an old monastery in Padua by Messrs. Lathrop and Fairchild, and, because it is bright rose-colored and of fine flavor, is being rapidly propagated and planted in California.

which are being distributed to prospective planters the suckers as they grow. This accomplishment of the Department of Agriculture is not the result of any one man's effort, but the product of at least a dozen minds working over a period of 20 years and in seven different countries. And the names of these investigators deserve to be here chronicled before their part of this unusual work is forgotten, as the industry which is now growing rapidly brings new personalities into the field. Walter T. Swingle, to whom is due the credit for the most profound work which has been done; H. E. Van Deman, J. W. Toumey, R. H. Forbes, T. H. Kearney, P. H. Dorsett, A. V. Stubenrauch, S. C. Mason, A. J. Pieters, Bruce Drummond, Consul Maggleson, E. A. Bessey, Dr. Vinson, Bernard Johnson, and David Fairchild are the names of those who took the most active part in this problem, while the name of Mr. Barbour Lathrop, of Chicago, should be specially mentioned, since it was through his generosity that the writer was able to make a study of the Persian and Arabian date regions.

There are among these hundred varieties those which candy on the tree, others which are used mainly for cooking, and some which are hard and not sticky. There are early varieties and late-ripening ones, varieties short and long, and every sort can be told by the grooves on its seeds.

One of the finest varieties is the Deglet Noor, which will bear from 80 to 132 pounds of dates per tree. As the dates sell from 8 to 35 and even 50 cents a pound, the possibilities of a profit of at least $150 an acre has been set as the probable mean on well-managed plantations.

The date as a delicacy is known to every American child, but, as a food, remains to be discovered by the American public. When the date plantations of Arizona and California come into full bearing, as they should in about 10 years, the hard, dry dates, for example, now quite unknown on our markets, are sure

Photo by Frank N. Meyer

THE HARDIEST BEARING OLIVE TREES OF WHICH WE HAVE ANY RECORD

A variety which has withstood a temperature of 2 degrees F. below zero, and which bears good crops of fruit. Cuttings of this variety have been secured by Mr. Frank Meyer from the Crimea.

to come into prominence and find their way to the tables of the poor as well as of the rich. The heat of our American summers is forcing us to study the hot-weather diets of other countries, and dates are sure to become important items of food.

The persimmon of the South, on which the opossum fattens, is a very different fruit from its relative the kaki, or persimmon of the Orient, the growing of which is so great an industry in Japan as to nearly equal the Japanese orange-growing industry in importance. Our persimmon is a wild fruit, which will some day be domesticated, while the kaki has been cultivated so long that it is represented by hundreds of distinct varieties of different forms and colors. It is true that the Oriental persimmon has been grown in this country; in fact, the census records a production of 68 tons; but this is scarcely a beginning as compared with the 194,000 tons which is the output of Japan.

We have misunderstood the persimmon. Our own wild ones we can eat only after they have been touched by the frost, and the imported Japanese ones we have left until they become soft and mushy and almost on the verge of decay. We never thought until quite recently of wondering whether in a land where the persimmon had been cultivated for centuries they would not have worked out some artificial method for removing the objectionable pucker. In Japan we find this is done by packing the fruit in barrels saturated with sake, and Mr. H. C. Gore, of the Department of Agriculture, is now working out new methods of processing the Oriental persimmon, so that it can be eaten when hard as an apple, and there will no longer be any reason

Photo by Frank N. Meyer

THE GIANT CHINESE PERSIMMONS IN BASKETS ON THEIR WAY TO THE PEKIN MARKET

Americans have no idea of the extent and value of this great industry in the Orient, where it means as much to the people as the apple industry does to us. Some day, when the plants which have been imported come into bearing, our horticulturists will see the great food-producing value of this neglected crop.

Photo by Frank N. Meyer

AN ORCHARD OF CHINESE PERSIMMONS IN THE MING TOMBS VALLEY WEST OF PEKIN

Professor Sargent, of Harvard, predicted that the introduction of this giant persimmon, which was accomplished by Mr. Frank N. Meyer, Agricultural Explorer of the Department, would be worth a million dollars to the country.

Photo by Frank N. Meyer

GIANT ORIENTAL PERSIMMON TREE

The trees of these Chinese persimmons are remarkable for vigor, productiveness, and long life. The fruits are quite distinct from the Japanese persimmons, or kaki, and entirely different from our Virginia persimmon. They may be said to constitute a new and valuable class of fruit for the American horticulturist.

why it should not take its place among the great fruits of the country.

We have also introduced a Chinese persimmon which Mr. Frank Meyer found in the Ming Tombs Valley, the Tamopan, four inches in diameter, seedless and puckerless.

The whole question of the improvement of the persimmon has been opened up, and we are getting for this work the small-fruited species called "lotus," from Algeria; a tropical species with white, cheese-like pulp, from Manila, Mexico, Erithea, and Rhodesia; species from Bangalore, from Sydney, from Madras, from the Nankau Pass, in China, and from the Caucasus.

There are large areas of the West where the native persimmon is the slowest tree to wake up in the warm spells that visit that region in February. It is reported that in Oklahoma last February the temperature went up to 80 degrees F., which is as high as the average midsummer temperature. This will wake up almost any tree or plant except the persimmon, and when a temperature of 17 degrees below zero follows, it kills thousands of plants to the ground. If the fine imported varieties can by breeding be made to share this characteristic with their American relatives, it will be an added reason for their extensive cultivation.

Photo by Crandall

THE TAMOPAN PERSIMMON: A NEW FRUIT FOR AMERICA

A natural-size photograph of a seedless and puckerless persimmon which is often four inches in diameter, and because it can be eaten while as hard as an apple, is destined to play a great rôle in the remaking of the persimmon industry.

If the Oriental timber bamboo had produced seeds oftener than once in 40 years it would long ago have been introduced and be now growing in the South. The fact that it had to be brought over in the form of living plants, and that these plants required special treatment, has stood in the way of the quick distribution of this most important plant throughout those portions of America where it will grow. After several unsuccessful attempts, a beginning has at last been made, and the Department has a grove of Oriental bamboos in northern Florida, and a search is being made in different parts of the world for all those species which are adapted to our climate.

It was while I was traveling in Japan for Mr. Barbour Lathrop, of Chicago, that he called my attention to the great

Photo by Frank N. Meyer

THE WILD PEACH OF CHINA, WHICH IS USED THERE AS A STOCK FOR STONE FRUITS

A stock which will resist drought and cold is worthy of the serious consideration of peach growers; and this Chinese wild peach, which probably is in reality the progenitor of all our cultivated peaches, appears to be such a stock. Experiments are in progress which will prove what our peaches will do when they are furnished with the root system of this wild, hardy peach from the mountains of North China.

Photo by P. H. Dorsett

A YOUNG ORCHARD AT THE CHICO PLANT-INTRODUCTION GARDEN IN CALIFORNIA, EVERY TREE OF WHICH IS FURNISHED WITH THE ROOT SYSTEM OF THE WILD PEACH OF CHINA

The statement has already been made that this is the earliest stock for stone fruits ever introduced into California. The orchard comprises plums, apricots, prunes, and almonds, as well as peaches, and will give an indication of the value to America of this new peach stock from the Orient.

Photo by David Fairchild

BLANCHED SHOOTS OF THE JAPANESE UDO

This is a new vegetable, with a unique flavor. It has been pronounced delicious by a great many people; and, because it can be grown throughout a wide range of territory in the United States, is one of the earliest in the spring, and can also be blanched in the autumn, it has attracted the attention of one of the largest growers of asparagus in the world, Mr. W. H. Meeks, who has planted several acres of it on the lowlands of the Sacramento River, California. It is as easy to grow as asparagus and yields a crop sooner.

importance of the bamboo as a new crop for the South. He was so firmly convinced of its importance that he offered to purchase and send as a gift to the country 2,000 plants for trial. Unfortunately, the offer was not accepted, and it was not until several years later that the large shipment was made which is now establishing itself in northern Florida, where the first commercial grove of these remarkable plants is to find its home.

"Of what practical use is the bamboo?" is the question of the Occidental, and it must seem to the Oriental as singular as his question would be, "Of what use is the white pine to the American?" For there is no plant in the world which is put to so many uses as the bamboo, and in the regions where it grows it is apparently the most indispensable of all plants.

In this country I predict it will be used earliest for barrel hoops, for cheap irrigating pipes, for vine-stakes and trellises, for light ladders and stays for overloaded fruit trees, for baskets and light-fruit shipping crates, and for food. As wind-breaks and to hold canal banks and prevent the erosion of steep hillsides, there are species which excel all other plants, while for light furniture and jalousies it is sure to find a market whenever the green timber is available.

Unlike the forest trees, the giant bamboos are true grasses. They send underground stems long distances through the soil, binding it together with hard, flint-like rhizomes. They send up from this network of roots and rhizomes the most rapid-growing shoots of any plants known; and, like giant asparagus stems, these shoot at the rate of a foot a day into the air. So fresh and tender are these shoots that they can be snapped off with the hand, and when cooked they form one of the great vegetable delicacies of the world.

Photo by P. H. Dorsett

THE FIRST COMMERCIAL BUNCH OF UDO PUT UP IN THIS COUNTRY

Shoots cut from plants set from 2-inch pots in May, 1910, on Mr. W. E. Meeks' ranch, Bryford Island, near Antioch, California. The shoots are a half to three-quarters of an inch in diameter and about 12 inches long. Taken at Antioch, California, March 28, 1911.

No wonder, then, considering all the uses of this plant, that the Chief Forester of Japan, when I asked him about the value of the bamboo industry in his country, said at once: "It's the best-paying plant industry in Japan." I am aware that there enters in here that complicated question of the cheapness of Oriental labor, and that there are many things which we cannot do with the bamboo

Photo by Frank N. Meyer

FRUITS OF THE YANG TAW VINE OF THE YANG-TSE VALLEY

This vine (*Actinidia chinensis*) grows wild along the great river of China, and its fruits are said to resemble the best gooseberries in flavor, being used by Americans resident there in the making of pies and jams. The vine itself is a rampant grower, and its foliage is unusually attractive. As an ornamental plant alone, it is worthy a place on every farm. Thousands of plants have been introduced, and it will soon be in the nurserymen's hands.

which are done in Japan and China. But all these things aside, the bamboo still remains one of the most promising plant introductions.

While perhaps the great majority of these new plants are brought in or purchased directly as results of investigations carried on in Washington, some of the most valuable things have been sent in by men and women living as missionaries or voluntary exiles in the most out-of-the-way places in the world.

Plant introduction is not a matter of one generation, and it is most preëminently a work requiring many men working together, and I doubt if there is to be found within the government service, or outside of it, a better example of coöperative, constructive investigation than that connected with the Bureau of Plant Industry in the establishment of new plant industries in the United States.

On the streets of almost any Japanese city the fruit and vegetable stalls have for sale an attractive blanched vegetable called udo. It is a near relative of a well-known wild plant in New England, the spikenard, but a much larger plant. There are many ways in which it is prepared by both the Japanese and the foreigners who live in Japan; but, either as a salad or cooked in the same way in which asparagus is cooked, it deserves to rank as one of the important vegetables of the world. It is easy to grow; it does not require replanting oftener than once in nine or ten years; it can be cropped in the autumn or in the spring, and it yields large crops of shoots, which are often two feet long and an inch or more in diameter at the base. These brilliant white shoots are edible to their very bases without the least objectionable fiber, and not in this respect like asparagus, of which only the tips are fit to eat.

It was while traveling with Mr. Barbour Lathrop that the writer first made the acquaintance of this vegetable and at his suggestion that plants of it were sent to America, in 1902.

One of our best-known botanical authorities once remarked to me: "You cannot introduce a new vegetable; it's impossible." While it might be admitted that the introduction of a new vegetable is a long undertaking, extending perhaps over the period of a generation, it should not be left out of account that the means at our disposal today are immeasurably more powerful than they were even two decades ago. The advent of the great hotels and the sympathetic interest of the great magazines are two elements which today make possible what yesterday would have been quite impossible.

The magazines will talk about a new vegetable and can now illustrate it as never before and in this way encourage people to ask for it, and the great hotels have learned how to profit by the introduction of novelties.

Of course, from the narrow standpoint of the asparagus grower we should all eat asparagus, and he watches every sign that indicates any tendency on the part of the public to consume more of his vegetable, and he is not often likely to look with favor on any rival. But let fancy prices be established by a legitimate publicity and the encouragement of some of the large hotels, and the growers of asparagus will soon find out that there is money in growing the new vegetable. We can trust to a final readjustment of things, once the new plant is thoroughly established.

It was with this point in view that an arrangement was made with the National Geographic Society, at its last Annual Banquet, to serve as one of the courses the dasheen, which is the root of a large-leaved plant related to the Hawaiian taro. The guests of the Society were kind enough to pass judgment on this new introduction, deciding it to be a valuable addition to the menu, many even going so far as to declare that it surpassed the potato in excellence.

The stimulus given to the cultivation of this dasheen by this exhibition has been very great and today thousands have heard of it, and, if they saw it offered on the menu of a first-class hotel, would be much more likely to call for it than if they had never read of its peculiar adaptability to the moist but well-drained lands of the Southern States.

# A VISIT TO THE BRAZILIAN COFFEE COUNTRY

By Robert De C. Ward, Harvard University, Cambridge, Mass.

ON THE gently sloping hillsides of the northern portion of a single State of the great Brazilian Republic there are growing 700 million coffee trees. Here on the famous rich, red soil (*terra rossa*), under extraordinarily favorable climatic conditions, the State of São Paulo is producing annually about three-quarters of the world's total coffee crop. Small wonder is it that this State ranks so high in the number and in the character of its population; in the development of its railroads; in its general commercial and industrial activity. Small wonder is it that the city of São Paulo is so full of life and energy; that Santos has become so famous a port; that the Santos docks and the São Paulo Railway attract so many visitors. Coffee is the mainspring of all this development. Coffee is the prevailing topic of conversation. Coffee is the key to the financial situation. Coffee is king.

As a famous waterfall, or an immense steel plant, or a great forest, or a wonderful view attracts the traveler, so this remarkable Brazilian coffee district has a fascination all its own for the "globe-trotter," or for the more leisurely traveler who seeks to know something more definite about our South American neighbors; or, more particularly, for any one to whom man's achievements in changing the face of nature by making the earth produce what he needs and what he finds profitable are a source of satisfaction and of inspiration.

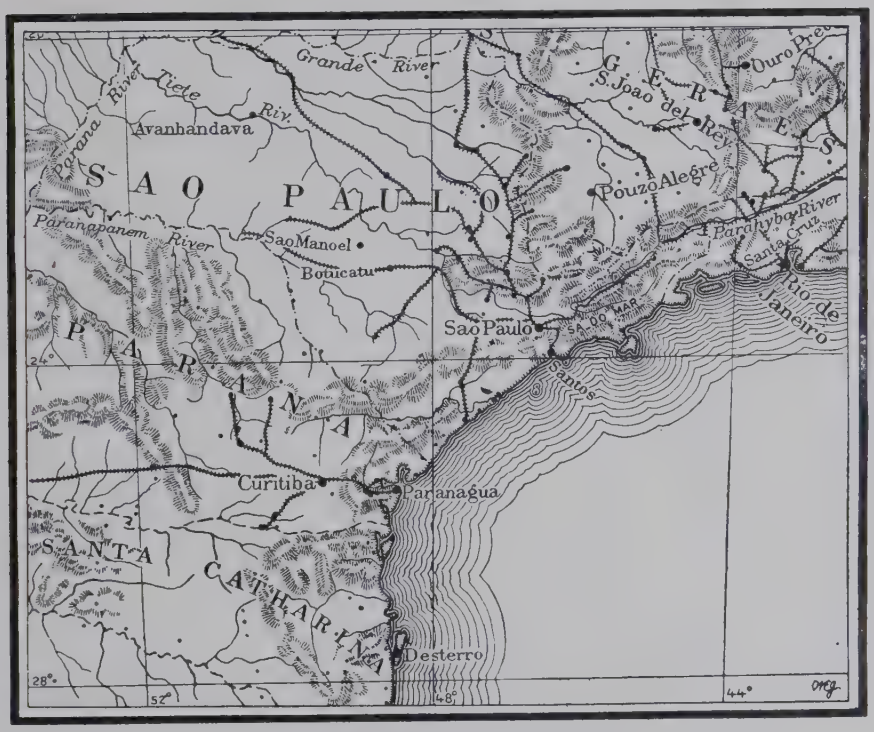
Recently the writer had the good fortune to visit this famous coffee district. The direct object of the trip was for the purpose of collecting information, at first hand, concerning the general geographic, and especially the climatic, conditions under which the Brazilian coffee grows, and also for the purpose of seeing the various stages in the cultivation and harvesting of coffee and in its preparation for market. Surely a crop whose importance is so great that a national government has gone into the business of conserving it deserves careful study.

The heart of the coffee country can be reached in less than three weeks from New York. To any one whose experiences in crossing the Atlantic are limited to the "Atlantic Ferry," with its crowded steamers, its frequently boisterous seas, and its changeable and stormy weather, the voyage to and from Rio de Janeiro will be a delight which cannot fail to satisfy even those who are not naturally lovers of the sea. What can be more ideal for any one who is tired out with the wear and tear of a busy life than that voyage of 16 or 17 days from New York to Rio, over the calm seas and under the bright skies of the tropics?

Most of the voyage is spent sailing in the trades, those wonderful easterly winds, blowing steadily day and night, year in and year out; where the sea is smooth, but where there are enough whitecaps to give it life; where the beautiful, cumulus clouds, like our own summer clouds at home, only more slender and more delicate, shine brilliantly in the tropical sun by day, grow to larger size in the afternoon hours, sometimes giving brief showers, but dissolve after glorious sunsets; where the temperature never varies more than a very few degrees above and below 80, and is perfectly comfortable because of the fresh breeze.

## FROM RIO TO THE COFFEE CENTER

From Rio de Janeiro a journey of about eight hours takes the traveler across the coast range of mountains (Serra do Mar) and along the valley of




MAP OF COFFEE DISTRICT OF BRAZIL

the Parahyba River to the city of São Paulo, which lies in a position of immense advantage to its commercial development. To it from the north and west and south converge the numerous lines of railway, which tap the coffee plantations on the north, and over which, from the southwest, will soon come the through trains from Montevideo, across the great rolling campos of southern Brazil. From São Paulo to the seacoast, as if it were the narrow neck of a wide funnel, runs the the São Paulo Railway, across the open country and then down the steep, heavily forested, seaward slopes of the Serra do Mar to the port of Santos—a wonderful piece of engineering, whose embankments and viaducts and masonry-work are well worth a long trip to see. Santos is the natural outlet for a great interior country, the importance and value of whose products are every day increasing.

From the city of São Paulo the heart of the coffee country is reached in a short day's journey along one of the lines of railroad which go in a northerly or northwesterly direction across the open campos or through the scattering woodlands. Under the able direction of Dr. Orville A. Derby, at present chief of the Brazilian Geological and Mineralogical Survey, the State of São Paulo has been well mapped. Portions of it have even been modeled, as in the case of the vicinity of São Paulo and Santos, and of the coffee district of Botucatú and São Manoel.

In about two hours after leaving the city of São Paulo the traveler begins to see the first considerable coffee plantations, and from that time on the journey

Photo by Gaensly

GENERAL VIEW OF A BRAZILIAN COFFEE PLANTATION

Photo by Gaensly

COFFEE FAZENDA: SANTA VERIDIANA, SÃO PAULO, BRAZIL: THE SMALL HOUSES ARE THE HOMES OF THE COFFEE-PICKERS, MANY HUNDREDS OF WHOM ARE EMPLOYED BY THIS LARGE ESTATE

YOUNG COFFEE TREES: SÃO PAULO, BRAZIL

Photo by Gaensly

is one of the greatest interest. Coffee is everywhere. Miles and miles of coffee trees stretch away, up and down the gentle slopes of the rolling topography, often as far as the eye can see—great broad waves of green, with the narrow lines of the red soil showing in marked contrast with the green of the leaves. It is a sight which is not soon forgotten. Here and there are small patches of forest which have not yet been destroyed to make way for the coffee. And then there come great stretches of rugged grass-lands, partly used for grazing purposes, or locally for farming, where the soil is not right for the coffee tree.

Here and there on the lower slopes of the hills or on the lowlands, standing out in marked contrast with the green coffee trees, are the white buildings of the *fazendas*—great, substantial stone and stucco manor-houses, with wide verandas and large windows, surrounded by gardens filled with palm, and banana, and orange, and mango trees; the extensive outbuildings, for the stables and for the machinery, for the laborers and for the superintendent, being placed at a respectful distance from the manor-house.

### HOSPITALITY THAT IS PROVERBIAL

Picturesque these Brazilian *fazendas* surely are, and hospitality to the stranger is one of the proverbial characteristics of their owners. Through the courtesy of Dr. Plinio da Silva Prado, of São Paulo, the writer, on his recent trip, was entertained at two well-known and representative coffee *fazendas*—that of Santa Veridiana and that of Santa Cruz.

At the former (see picture, page 911) he was the sole occupant of the great house, which was put entirely at his disposal. There was nothing in the way of hospitality which the excellent *administrador* of Santa Veridiana, Senhor Rosetti, left unthought of or undone. The same thing was true of Administrador Carlos Meizner, of the *fazenda* Santa Cruz, which, by the way, was the one selected for inspection by Senator (then Secretary) Root during his trip to South America, a few years ago. The name of the nearest railroad station was at that time changed to "Elihu Root" in his honor.

All these Brazilian *fazendas* have a peculiar charm—an appearance of solidarity, of comfort, of peace, and of prosperity—as they lie there, surrounded by the wealth of their coffee trees, with cattle grazing on the neighboring fields, and with the ever-busy, picturesque Italian laborers caring for the precious crop, whose market prices are quoted daily in all the important papers throughout the civilized world. Grim and forbidding some of these manor-houses certainly do look from the *outside*, but once inside them there is no feeling except that of being at home.

### THE FRUIT OF THE COFFEE TREE

The coffee trees on a Brazilian plantation begin to bear in from two to four years after they have been removed from the nurseries, where they grow in wicker baskets, under shade, to their permanent places in the open. The fruit, when ripe, is red, and resembles a small cherry, or cranberry, in general appearance. The coffee which we see in the grocery store is the seed of this coffee berry.

Normally each berry contains two seeds, flat on one side and convex on the other, the flat sides being together. The seeds are imbedded in a sticky, whitish pulp, and are further themselves surrounded by two envelopes. Of these, the inner one, when dry, is a delicate and closely adherent membrane, known as the "silver skin," and is much like the thin white skin which covers the onion. The second, or outer, covering is tougher and thicker, fits more loosely, and is not unlike the husk of wheat.

Before the coffee beans can be put upon the market the outer covering, the pulp, and the two inner coverings must be removed. This is done by first washing and softening the whole berry in water, then removing the outside skin and pulp in the pulping machine ("wet method"), then drying the beans in their two inner envelopes, and finally removing these inner coverings by friction in the hulling machines.

### HOW THE BERRIES ARE PREPARED

It is customary to classify the methods of preparing coffee for market into the *wet* and the *dry*. They are alike, after a certain stage, and there is disagreement among experts as to the relative merits of the two in producing the best coffee. In the dry process the berries are dried before the pulp is removed, and then outer covering, pulp, and inner coverings are removed together. In the wet process the pulp is first removed in water, and the drying and removal of the inner envelopes come later.

There is no absolutely hard and fast rule, invariably followed on all *fazendas* alike, in the preparation for market of the coffee beans. At the two *fazendas* visited by the writer most of the coffee was treated by the wet method, the bulk of the crop being ripe and therefore in a condition to be pulped easily. In case, however, the berries were over-ripe, and therefore dry, or under-ripe, and therefore green, so that they could not be pulped, they were dried directly after being washed, and went through the so-called dry process. The following account therefore deals chiefly with the wet method.

A considerable water supply and a carefully planned system of small canals and of basins is needed in the wet method, and it is partly for this reason, as well as because of the preference of some *fazendeiros* for the dry method, that the wet method is not everywhere in use.

### THE QUESTION OF LABOR

The harvest begins in May and lasts into August, or even September. This is the dry season, so that the weather conditions are very favorable, not only for the harvest itself, but for drying and transporting the crop after it has been gathered. In picking the coffee, the boughs are pulled down with the left hand and held at the outer end, while the right hand is run along the bough from the base to the tip, thus stripping off the berries as well as many leaves and twigs. For the upper branches rude step-ladders are used, but these are generally not allowed to rest against the trees.

In this work of harvesting all the laborers on the *fazenda* take part—men, women, and children—except those who are too old, or too young, or who are ill. Several hundred, or even thousand, pairs of hands are thus busy for weeks on each large *fazenda* gathering the precious crop.

Most of the laborers are now Italians, many of whom make a contract to stay for a year; but some are permanent settlers. There is a considerable amount of migration going on all the time to and from Italy and to and from Argentina. Immigration under contract has been done away with, so far as the Italians are concerned, and these people now come and go of their own initiative. In many cases the children who have been born on the *fazendas* stay permanently as laborers.

Following the custom of the old slavery days, the laborers (*colonists* they are called) live all together in small one or two-family cottages in a certain portion of the *fazenda,* which is walled or fenced off from the rest. Here they have their chapel, and can keep their own goats and pigs, and near by they cultivate their own fields of corn, or mandioc, or beans, The owner of the plantation provides medical attendance and a hospital, a corn-mill, sugar-mill, etc., but there seems to be no general organized system of schooling for the children.

As the work is usually done at considerable distances away from the "colony," the colonists start out early in the morning and do not return until darkness prevents further labor. They take their food with them and eat it under the coffee trees. The curfew rings at 8:30 or 9 p. m., and after that all must be silent in the colony.

The colonists are paid in various ways. At Santa Veridiana they are paid by the number of bags of coffee berries which each family picks, the bags being numbered and counted as they are brought in. Other laborers are paid by the day. Others, again, are paid so much for taking care of a certain definite number of

Photo by Gaensly

NEAR VIEW OF COFFEE TREE COVERED WITH BERRIES

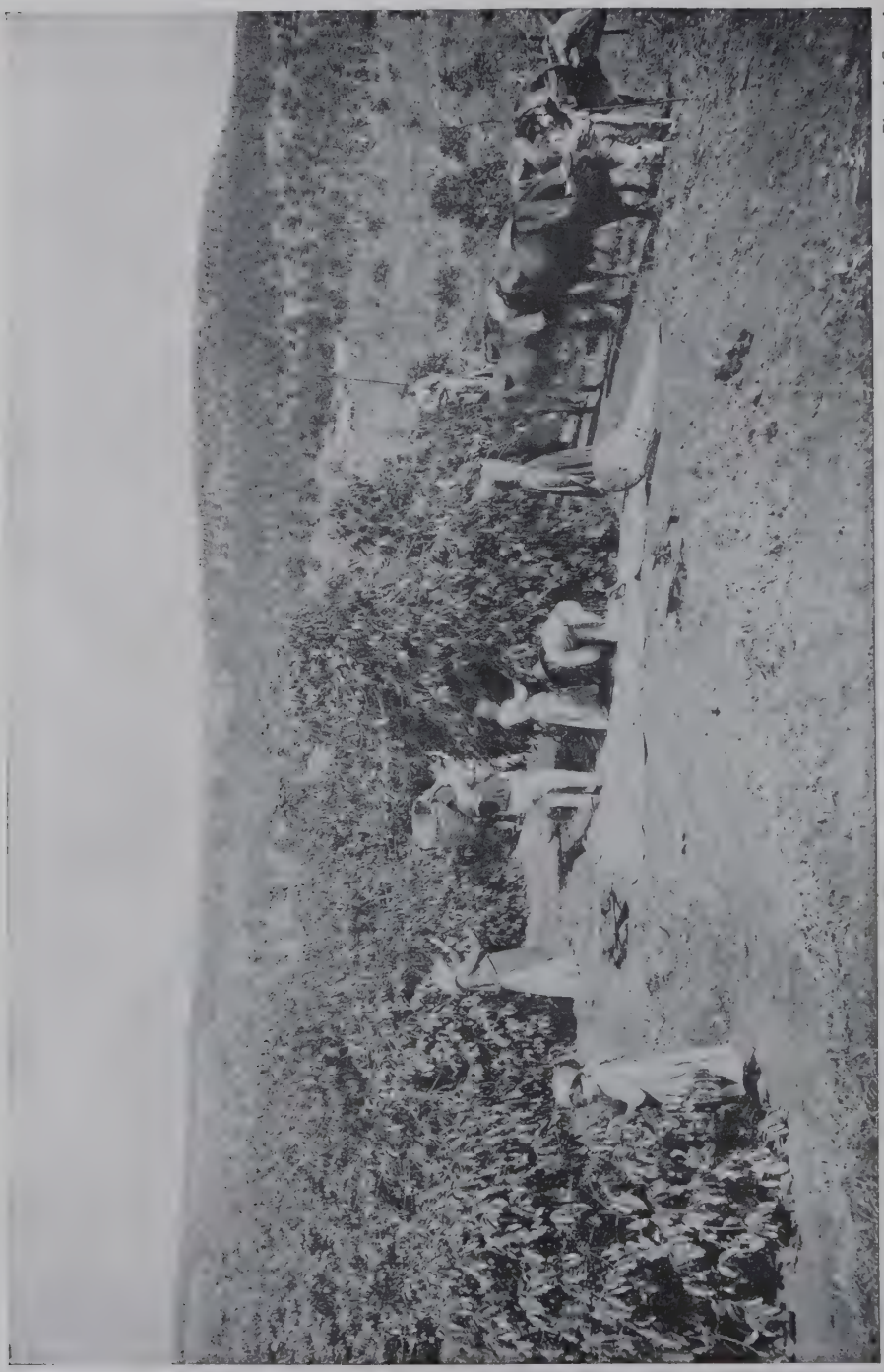


Photo by Gaensly

PICKING COFFEE: SÃO PAULO, BRAZIL

Photo by Gaensly

PICKING COFFEE IN BRAZIL

Photo by Robert DeC. Ward

BASIN WHERE THE COFFEE IS WASHED AFTER BEING PICKED

trees. In one day each laborer may gather enough coffee berries to make 50 pounds of dried coffee.

### THE HARVEST

The usual method of harvesting is to let the berries, leaves, twigs, etc., fall directly on the ground, where they are later raked together with wire rakes with rounded teeth, and the first rough sorting is made. The next stage is a winnowing by means of a wire sieve, the hand being used to pick out the twigs and leaves and the wind blowing away a good deal of the dust as the contents of the sieve are thrown up into the air and caught again several times. In a less common method the results of the harvesting are allowed to fall onto cotton cloths spread out underneath the trees. This makes the gathering of the crop quicker.

In any case, the ground underneath each tree is very carefully looked over and swept, so that none of the precious berries may be lost. When the preliminary winnowing has been completed in the field, the berries, together with some small twigs, leaves, and much dirt, are packed into sacks, which are placed at the ends of the rows of trees along the roads which traverse the plantations at intervals, and are then carried off by wagons.

### SEGREGATING THE RIPE AND UNRIPE BERRY

As they are brought from the harvesting, the coffee berries are ripe (red), or over-ripe (brown or blackish), or still unripe (green). It is impossible in picking to select only those berries which happen to be ripe. The contents of the sacks, preferably on the day of picking, are dumped into a narrow cement or brick-lined canal through which a strong stream of clean water is flowing. This canal is supplied from a small reservoir, and is preferably built on a hillside above the drying grounds (*terreiros*) and the machinery, so that gravity may carry the berries to the successive early stages of the process of preparation. From this canal the water flows through a couple of large vats, or basins, being kept in motion both by the force of gravity and by means of long-handled wooden or metal rakes, or hoes, moved actively to and fro by workmen.

This manipulation results in bringing the unripe, light, imperfect, and dry berries to the surface of the water, while the heavier and riper berries sink to the bottom, the sides of the trough usually sloping toward the bottom. By allowing the level of the water surface to rise, all the berries which are floating on the surface can be run off into an adjacent maceration basin, where those which are not too dry are allowed to soften for a few hours, sometimes under canvas covers, before they are carried into the pulper (*despolpador*). If the berries are too dry for pulping, even after being softened, they are carried by water directly to the drying grounds, and are prepared by the dry method.

The ripe berries do not require the intermediate stage of maceration. These

Photo by Robert DeC. Ward

BASINS FOR MACERATION OF COFFEE BEFORE PULPING

ripe berries which have fallen to the bottom of the first (*i. e.*, washing) basin are there very thoroughly raked and shoveled, the water having been lowered so that the men can stand among the berries at the bottom of the basin. The sand is generally carried off with the water through iron gratings at the bottom, or is collected at the upper end, until finally the clean, ripe berries are ready to pass out, down a narrow canal, with a stream of clean water.

For the ripe berries, the maceration basins are simply used for the purpose of temporary storage on the way between the washing basins and the pulper. To the top of the pulper the berries are carried again by a stream of water whose velocity is carefully but easily adjusted by a system of gates. The berries are dropped through the funnel-shaped top of the pulper directly into the machine.

Pulpers are made of different patterns, and are run by water, steam, or horse-power; but the general principle is the same in all of them. In one of the most widely used forms there is a revolving copper cylinder, whose surface is set with small knobs, or nipples, and is covered on one side by a surface of wood, or metal, or rubber, against which the cylinder impinges as it revolves. The coffee berries carried to the pulper by the stream of water are crushed between these two surfaces, whose distance apart can be varied to suit the particular size and condition of the berries at that time being pulped, and the pulp is thus macerated and loosened. The object is to accomplish this without injuring the two inner coverings of the seeds.

### THE REDUCTION MACHINERY

The pulper reduces the coffee berries to a wet "mush," consisting of much water, coffee beans, and loose pulp. Most of the pulp adheres to the teeth of the cylinder and is dropped off at the bottom of the revolution, while the coffee beans, many of them still incompletely pulped and all having more or less pulp adhering to them, are carried, always by water, into a large copper cylinder revolving on an axis slightly inclined from the horizontal and pierced with small elongated holes, just large enough to let the pulped

Photo by Gaensly

DRYING GROUNDS: FAZENDA SANTA CRÚZ, SÃO PAULO, BRAZIL: SHOWING ARRIVAL OF PULPED COFFEE BY WATER TRANSPORTATION, AND FIRST SPREADING OF COFFEE

beans fall through, but keeping all beans which are not properly pulped moving on toward the lower end, where they fall into a second pulping machine, which is adjusted more finely, and are passed through a second sorting process.

All coffee which is properly pulped, either by going through one pulper or two, is carried by water into brick or cement-lined fermentation basins, which have a grilled bottom, so that the water may escape and leave the coffee in the basins.

Photo by Robert DeC. Ward

CANAL FOR CARRYING COFFEE FROM MACERATION BASINS TO PULPING MACHINERY
(SEE PAGE 919)

Here the beans are allowed to remain, usually between 24 and 72 hours, according to the condition of the berries and the external temperature, until a slight fermentation has set in. The object of this fermentation is to soften and loosen any still adherent pulp. In these fermentation basins the coffee beans may be further manipulated in water by means of long-handled rakes with blunt edges; *i. e.*, washed. They are then ready for the drying grounds, any still remaining pulp and external skin being later removed in the hulling machines. Any coffee which, after going through the second pulper, is still not properly pulped, is seen, on examination, to have been too green, or too small, or too dry to be handled by the pulper. All these berries, as well as the thoroughly pulped ripe ones, go to the drying grounds and go through the final stages, just as does the pulped coffee.

The ideal arrangement of a *fazenda* is seen at Santa Veridiana, where running water does the work of transportation from the first stage until the beans are spread out on the drying grounds, the whole plant being laid out with this end in view, and the natural slope of the ground being utilized to the utmost. At this particular *fazenda* there is a continuous slope from the place where the coffee is dumped from the sacks into the first canal down to the railroad tracks at the bottom, where the coffee beans, ready for market, are placed on the cars. Where such an ideal arrangement is not possible, elevators or hand-cars are necessary to carry the coffee from one level to another.

### THE DRYING GROUNDS

The most important and the most critical stage in the preparation of coffee for the market comes when the beans, having had their pulp removed, are dried, in order that the two inner coverings may then be removed by friction.

The drying grounds are prominent features of every *fazenda*. They are extended rectangular areas, paved with blackened tiles, or bricks, separated from one another by one or two rows of bricks, so that the various lots of coffee in different stages of drying may be kept apart, and all together forming part of a great, gently sloping surface inclosed by walls.

To the drying grounds the pulped coffee is carried from the fermentation basins, usually by a stream of water which can be directed through any one of a number of underground channels, to any part of the drying grounds. In the ideal arrangement of a *fazenda*, as at Santa Veridiana, water running down hill does all the work of carrying the coffee beans to the separate divisions of the *terreiros*. In other cases, as at Santa Cruz, there may be need of hand-cars,

Photo by Robert DeC. Ward

DRYING GROUNDS, SHOWING METHOD OF DISTRIBUTING COFFEE BY MEANS OF HAND-CARS: FAZENDA SANTA CRUZ, SÃO PAULO, BRAZIL

Photo by Robert DeC. Ward

DRYING GROUNDS, SHOWING THE OPENINGS FOR THE ESCAPE OF WATER

Photo by Robert DeC. Ward

DRYING GROUNDS, SHOWING METHOD OF SPREADING COFFEE: FAZENDA SANTA VERIDIANA, SÃO PAULO, BRAZIL

pushed by laborers along movable tracks, for distributing the coffee.

When carried by water, the coffee is brought through an underground channel to the surface of the drying grounds, and is there shoveled up into a heap, from which it is later distributed by means of wooden shovels, or hoes (see picture, page 922). The water runs off down the slope to openings which are provided for this purpose.

The winter weather is ideal for drying the beans. With prevailingly clear skies, light winds, strong sunshine, dry air, and rarely any showers, outdoor drying as practiced in Brazil is a remarkable success. The time needed for thoroughly drying the berries varies greatly, and it requires constant oversight and care on the part of the *administrador* to see that each lot of coffee as it lies on the *terreiros* receives just exactly the proper amount of drying.

Excessive heat, too rapid drying, too little drying, too slow drying—all injure the quality, the flavor, the color of the beans, and therefore affect the market value of the coffee. It is upon the drying grounds that the *administrador* of the coffee *fazenda* has the most need of all his training and experience. He is constantly on the ground, directing the

DRYING GROUNDS (TERREIRÓS): FAZENDA SUPERCIO, SAN MANOEL, SÃO PAULO, BRAZIL

Photo by Gaensly

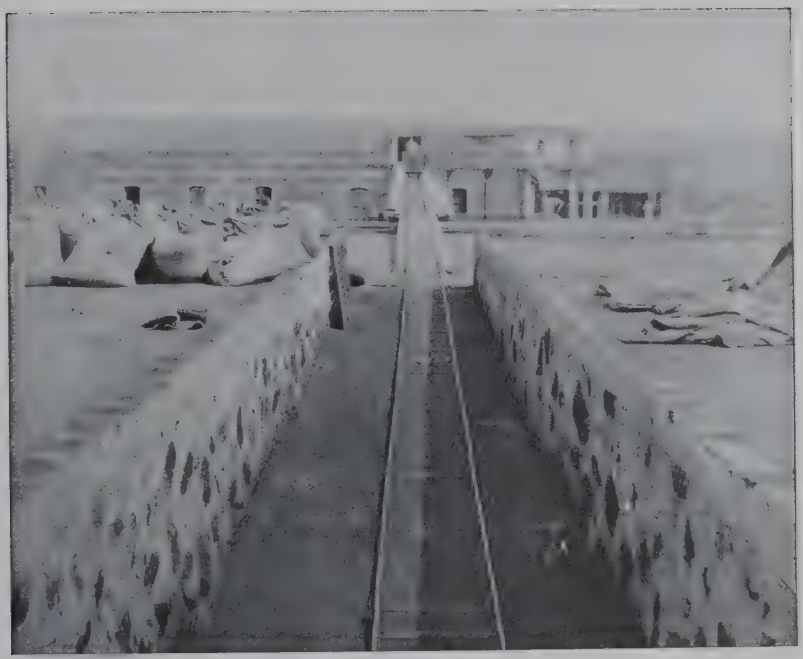


Photo by Robert DeC. Ward

TRACK FROM DRYING GROUNDS TO MACHINERY HOUSE: FAZENDA SANTA VERIDIANA, SÃO PAULO, BRAZIL

laborers to spread this coffee out, to gather that coffee into heaps, to give this coffee another three or four hours of sunshine, to take that coffee from the *terreiros* to the warehouse. Each lot of coffee on each separate division of the drying grounds really requires and receives special treatment.

It is an extremely interesting sight, during harvest time, to watch the laborers on the drying grounds, constantly moving about from place to place, spreading out or gathering up the coffee, and at night piling it up into heaps, which, if necessary in order to protect them from rain or wind, are covered over with canvas.

The duration of the drying stage naturally varies greatly, from a few hours to many days, and depends to a large extent upon weather conditions. Coffee which has not been pulped takes much longer to dry. Thus far, in Brazil, there has been little resort to artificial drying, most of the growers preferring outdoor drying. With such winter weather as prevailed during the drying season of 1910, when the present writer was in Brazil, there is surely no need of any artificial drying.

### REMOVING THE INNER SHELLS

The drying completed, the coffee beans which have been pulped are still inclosed in their inner and outer skins, or coverings, which are now dry and brittle. The next step is to remove these two envelopes. To accomplish this result without injuring the bean inside is the object of the ingenious and expensive machinery through which the coffee passes after leaving the *terreiros* and before it is finally packed in bags for shipment from the *fazenda* to Santos. Throughout this last stage in the preparation of coffee there are many different methods in use

Photo by Gaensly

COFFEE MACHINERY: BRAZIL (SEE TEXT, PAGE 930)

Photo by Gaensly

PORT OF SANTOS, BRAZIL, WHERE OFTEN THE QUAYS ARE LINED FOR TWO MILES WITH STEAMERS TWO AND THREE DEEP, ALL LOADING WITH COFFEE

Photo by Gaensly

COFFEE WAREHOUSE: SANTOS, BRAZIL

Photo by Gaensly

LOADING COFFEE AT THE SANTOS DOCKS

and many different machines. In what follows, reference is made to what the writer himself saw.

When thoroughly dry, the coffee beans are gathered into heaps, put in sacks, and loaded on a hand-car, which travels on small tracks from the *terreiros* to a large building containing the storage bins and the machinery. The beans are first dumped into large bins containing coffee of various grades, and from these they are carried, as needed, to the first of the final stages. The first machine is a ventilator, in which an upward current of air, driven at a high velocity by a blower, carries the dust, outer shells, and lightest beans upward, but lets the heavy beans and any remaining stones and sand fall to the bottom, where a sieve, in rapid oscillation to and fro, separates the beans from the sand.

The modern machinery now in use in Brazil for removing the two inner envelopes from the coffee beans is of many different patterns and makes, but the object is the same in all forms, viz., to manipulate the beans between two surfaces, one of them in motion, until by friction the envelopes, or shells, come off and are carried in one direction while the beans go in another. Coffee which, because too dry, or too green, or imperfect, could not be pulped, is, as already noted, dried on the *terreiros*. It is then sent through the hulling machine just as if the outer skin and pulp had already been removed.

The general principle of the huller is very simple. A metal cylinder with a grooved or convoluted surface rotates inside of an adjustable metal cover, also grooved on the inside. The coffee beans, passing between these two grooved surfaces with much friction, gradually have their coverings rubbed off. Other hullers have a sort of Archimedes screw arrangement of varying sizes of thread, while others, again, produce the desired result by the friction of an iron or steel network against a rubber surface.

### REMOVING THE DUST AND HULLS

From the hulling machine the coffee goes through a second ventilator, which throws off the dust and hulls, leaving the coffee beans clean and ready for sorting, and then to a separator. This, in a common form, is a hollow wire or copper cylinder in three or four compartments, all communicating, each compartment having holes of a certain definite size. The cylinder is gently inclined and is kept revolving, the coffee beans traveling slowly down the incline. Sometimes there is a spiral worm running down the central portion of the cylinder, which helps the beans to travel down the slope. Those which fit the openings in any one compartment fall out of the cylinder there; those which do not, slide along into the next compartment, and so on until they meet with perforations through which they can escape. There is thus a first classification, according to size.

Another form of separator, sometimes used alone or in addition to the one just described, consists of a series of wire sieves with mesh of various sizes arranged vertically so that each successive sieve slopes off at a small angle in the opposite direction from that of the sieve above, each division being slightly overlapped by the one above. The coffee beans fall in at the top, into the uppermost sieve. This, kept in rapid vibration to and fro, lets any beans which fit the mesh of the first division fall through, while those which do not fit these openings are shaken down onto the next sieve, and so on, all the way to the bottom. In this way the beans may be mechanically sorted into six or eight categories. They fall directly from the machine into the bags through funnel-shaped troughs.

The final stage is the *catador,* in which the beans are subjected to a strong upward current of air, which separates them according to weight into two (or more) categories. There is usually a glass window in the front of the *catador,* through which the beans may be seen carried up by the strong draft, the heavier ones falling, the lighter ones rising. The strength of the draft can, of course, be regulated.

A very ingenious single combination machine, recently installed at Santa Veri-

diana, does all the work which follows the *terreiro* stage, viz., that of the ventilators, the huller, the separators, and the *catador*. This machine, which was invented by a Brazilian, has thus far given perfect satisfaction, and it occupies but a small portion of the space which was formerly taken up by the six machines which it has replaced.

READY FOR SHIPMENT

The coffee beans—hulled, cleaned, and sorted—fall directly from the last machine into the bags. When these contain 132 pounds each they are sewed up and are ready for shipment to market.

Along the roads, deep in red dust, six or eight yoke of oxen draw the heavy wagons, loaded with the precious sacks, to the nearest railroad station, in cases where the railroad does not come directly into the *fazenda*, as it often does.

Off to the south go the trains, first to the city of São Paulo, and then down the steep eastern slopes of the Serra do Mar to the world's famous coffee port. In Santos, coffee absolutely dominates the lives of the people. Coffee is everywhere—on the streets, in the warehouses, on the train. Every one is busy with coffee. The docks are lined with two or three miles of steamers, often lying two abreast, all waiting to load coffee—a wonderful sight—steamers flying the British flag, and the German flag, and the French flag, and the Brazilian flag—steamers flying almost every known flag except our own glorious Stars and Stripes. Here in Santos, in the big warehouses lighted from above, the coffee dealers carefully blend and repack the precious berries. Here the holds of the waiting steamers are filled almost to the bursting point with the well-known flat bags of coffee. Here the traveler sees the last step in the progress of the coffee berry, from the time it ripens on the tree until it leaves Brazilian soil, to furnish some breakfast table in a far-off land with the favorite morning beverage of the civilized world.

# A CORNER OF OLD WÜRTTEMBERG

By B. H. Buxton

*With Photos by the Author*

GERMANY in the middle ages was a part of the Holy Roman Empire, at the head of which was the Emperor, and under him a host of petty princes, dukes, and counts more or less independent. As the power of the Emperor waned that of the petty rulers waxed until they became quite independent, ruling their little states autocratically. By degrees the more powerful among them increased the area of their domains at the expense of the less powerful, so that at the present day under the newly constituted German Empire there are only five states of any importance and not more than about 15 unimportant ones.

North Germany consists practically of the giant Prussia, with the small kingdom of Saxony and a scattering of the insignificant states, while South Germany is made up of the kingdom of Bavaria on the east, the Grand Duchy of Baden on the west, with the kingdom of Württemberg between them.

Württemberg is a fairly compact little state, except for a small wedge of Prussian territory entering from the south. The history of Württemberg is that of the more aggressive German states. The counts of Württemberg are first heard of in the twelfth century, holding a castle on what is now the Rothenberg (Redhill), in the neighborhood of Stuttgart,

the present capital of the kingdom. By 1500 the counts had so increased their power and extent of territory that they were created dukes by the Emperor Maximilian, and dukes they remained until 1806, when Napoleon, for services rendered by Württemberg against Austria, made the duke into a king and added largely to his territory in 1806 and 1810, the new kingdom thus constituted being about one-third larger than the original dukedom.

Württemberg since that time has not increased its acreage, and is popularly, though not officially, divided into Old Württemberg and New Württemberg, the latter being that part of the state which was added by Napoleon. This unofficial division into old and new Württemberg is of importance, as will be seen in considering the distribution of religious beliefs in the country. In 1871 Württemberg joined allegiance to the newly constituted German Empire.

Württemberg for governmental purposes is divided into four "kreise," or counties, and each kreis into a number of "oberamts," or districts. In an oberamt are 30 or 40 "gemeinde," village communities, or townships, each consisting of a single village, or town, with the adjacent land. The Nagold Thal (Valley of the Nagold) lies chiefly in the oberamts Nagold and Calw, of the Schwarzwald (Black Forest) kreis, and belongs to Old Württemberg, with the exception of a small part of the watershed south of Nagold, which is in the oberamt Horb and belongs to New Württemberg. The Nagold River itself rises at Urnagold, in the oberamt Freudenstadt, runs in an easterly direction to Nagold, where it turns due north, and flows past Calw and Liebenzell into the Enz at Pforzheim, the Enz itself running from Pforzheim east to Besigheim, where it joins the Neckar.

From Urnagold to Altensteig, 10 miles above Nagold, the Nagold is an insignificant stream and rather inaccessible, but from Altensteig to Pforzheim the scenery throughout its entire course is exceedingly picturesque and beautiful, without, however, the grandeur of the mountainous Black Forest country immediately to the west. The valley is narrow and the steep slopes are clothed with pine forests, a strip of fertile meadow land on either bank of the river.

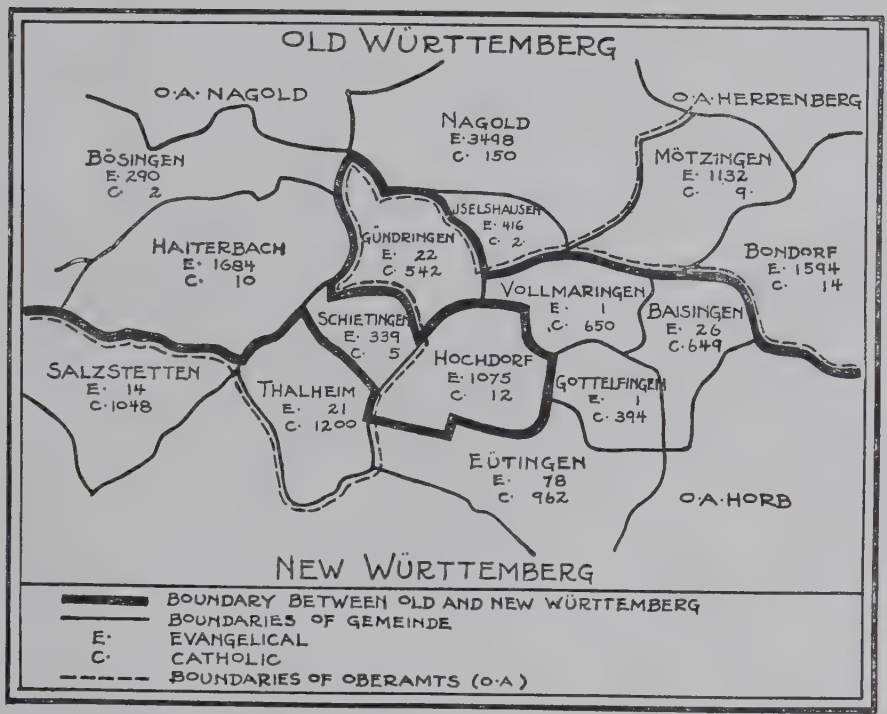
At various points are picturesque towns and villages, some, as Altensteig and Wildberg, perched on precipitous slopes overhanging the river; others, at points where the valley widens out, situated on the river banks—Nagold, Calw, Hirsau. Tanneries and sawmills abound and there are not a few cloth and woolen mills, all operated by water-power derived from the river, which is swift and too small for navigation.

The watershed on the left bank of the river presents a broken, hilly surface, the foothills of the Black Forest range. The upland country of this side of the river is heavily wooded, with relatively little devoted to agriculture, the villages being small and scattered.

The watershed of the right or east bank, mostly in the oberamt Herrenberg, presents a very different aspect, being a rolling, fertile upland with numerous compact, prosperous-looking villages, and the land entirely devoted to agriculture, except for a few acres of wood in each gemeinde, planted and controlled by the community for general use. Wheat, oats, and roots furnish abundant crops, and hops, introduced about 1840, are largely grown in sheltered spots, but the climate does not permit of vine culture. The system of farming is that of southern Germany generally.

The farmers, all of whom own their land, live in the villages and own strips of land scattered throughout the gemeinde. Not a house nor even a barn or shed is to be seen outside of the village, nor is there a single fence or hedge. The strips of land (gewannen) are long and narrow, often not wider than is necessary to turn a plow.

The system has arisen as a logical outcome of the arrangements of early days, when the land belonged to the gemeinde (gemeinde means commonwealth), and was parceled out among the farmers for yearly tenancy, each farmer receiving a




proportion of good and a certain proportion of inferior land, so that he might be allotted half a dozen plots in various parts of the common land. By degrees it became customary for the same parcels of land to be allotted to the same families each year, and, after some generations, individual ownership in the land became established.

As the individuals of each family increased in number the plots became more and more divided up among the sons, until today they can be divided no longer, and it has become the custom for one son only to remain on the farm, the others seeking their fortune elsewhere.

### MARKED SIMILARITY OF NAMES BETWEEN THESE AND OLD ENGLISH CITIES

Of the villages on the rolling uplands east and south of the Nagold Thal, a great number have the termination "ingen," as Jettingen, Geckingen, etc., and some end in "heim," as Stammheim, Ostelheim. These terminations in "ingen" and "heim" are of rather peculiar interest, since they indicate the earliest Teutonic settlements. Before the time of the Romans the Celts, or a Celtic-speaking people, were in possession of what is now Württemberg, and have left their traces in the names of some rivers and mountains; the word Nagold itself probably contains a Celtic root. During the first century B. C. the Germans began to pour in from the north and the Romans from the south, but the Romans gained the upper hand and occupied the country till the fourth century A. D., towards the end of which they were finally driven out by the Alamans, or Swabians (Roman Suevi), a branch of the German Franks, who swept in from the north up the valley of the Neckar. About the same time the Angles and Saxons invaded England and founded numerous settlements with names ending in "ing," "ingham," "ing-

Photo by B. H. Buxton

WEST GATE TO THE OLD FORTIFIED TOWN OF VILLINGEN: WÜRTTEMBERG

Photo by B. H. Buxton

GATEWAY TO HORB, ON THE NECKAR RIVER, ANOTHER OLD FORTIFIED TOWN IN WÜRTTEMBERG

Photo by B. H. Buxton

A HOUSE IN HORB, WÜRTTEMBERG, BUILT AT LEAST 200 YEARS AGO

The houses in these old fortified towns were built 5 and 6 stories high, as the space within the walls was limited, consequently their appearance suggest to the American traveler the skyscraper of today.

Photo by B. H. Buxton

STORING HAY IN THE LOFT OF THE SAME HOUSE AS SHOWN IN THE ADJOINING PICTURE

The ground floor of these houses is generally used as a stable and cowshed; the next two stories are occupied by the family, and the three upper stories, which are practically attics, are devoted to the storage of hay and grain (see page 939).

Photo by B. H. Buxton

REAR VIEW OF SEVERAL HOUSES, SHOWING HOW CLOSELY THEY ARE PACKED TOGETHER IN SOME TOWNS (SEE PAGE 938)

Photo by B. H. Buxton

REAR VIEW OF AN OLD HOUSE AT ROTTWEIL, WÜRTTEMBERG: NOTE THE WINDOWS IN ROOF

ton." The "ing" signifies "son of," or "family," and we have the Basings, or Bas family; the Hardings, or the Hard family; the Heckings, or the Heck family, and so on.

The "ingens" are found scattered very thinly throughout Germany, except just in Württemberg, and parts of Baden, Bavaria, and Switzerland, bordering on Württemberg, and it is probable that the Anglo-Saxons who invaded England and the Alamans who migrated up the Neckar were of the same stock. Not only do the place-names have the common ending in "ing," but the family names are also very frequently exactly alike; too frequently, indeed, to make it seem probable that the resemblance is purely accidental.

Thus the family of the Basings appear to have been very widely distributed, and is represented in England by Basing, Basingstoke, Bessingham, etc., and in the South German "ingen" district by Baisingen, Bosingen (locally pronounced Baisingen), Bessingen, etc., though perhaps the Basings and the Bessings were distinct families. Again, we find in England, Effingham; and, near Stuttgart, Oefingen, which in an old map of 1608 is written Effing.

If we take the county of Norfolk, in England, in which there are a large number of "ings" and "inghams," we can compare some of the names with those in the "ingen" district.

| *Norfolk.* | *"Ingen" District.* |
|---|---|
| Mettingham | Mettingen |
| Hasingham | Hasingen |
| Wendling | Wendlingen (3 times) |
| Heckling and Hecklingham | Hecklingen |
| Wellingham | Wellingen |

and many others equally comparable.

Canon Taylor, in a little book called "Words and Places," has attempted to homologize the "inghams" of England with the "ingens" of South Germany by supposing that the "ingen" is a corruption of "ingham"; but in the earliest documents of the eighth century the "ingens" are called "inga," or "inger," which is less like "ingham" than the modern "ingen," while in a map of 1608 most of the "ingens" are written as "ing" simply, although this may have been an abbreviation to economize space. It is, at any rate, more probable that the "inga" or "ingen" is the genitive or the dative of the "ing," so that Baisingen, for instance, means "settlement of," or "at the Basings," and is the homologue of the English Basing. In England, Bessingham certainly means home of the Basings, or Bessings, and Basingstoke means inclosure of the Basings (stoke= inclosure); and again, Basington is the house of the Basings.

With regard to the "heims," they appear to have been founded by another branch of the Franks, since they are only thinly scattered in the "ingen" district, but occupy a territory exclusively their own in Alsace, on the left bank of the Rhine, between the Black Forest and the Vosges Mountains.

The race of Franks which founded the "heims" does not appear to have had family names ending in "ing," as we find no "ingheims," but such places as Knorsheim, Shäffersheim, Sigolsheim—*i. e.*, home of Knor, Shäffer, Sigol—or else Quartzenheim, Bolzenheim, Witternheim; *i. e.*, the home of, or at the Quartzes, Bolzes, Witters. There are, however, a few, but very few, "igheims," as Besigheim, Hurtigheim, which were probably originally "ingheims."

Besides the "ingens" and the "heims," there are a number of places ending in "weil," "weier," "weiler," "viller"; *e. g.*, Rottweil, Bodersweier, Gebweiler, Nebviller, which are found edging the forests and mountains of the Black Forest and Vosges. The "weil," or "weiler," was a single habitation, not the settlement of a family group, the broken ground where the "weilers" occur not having been sufficiently cultivated at the time of settlement to support more than a single couple in each open spot. The "weilers" were probably of later date than the "ingens" and the "heims."

The accompanying map shows the distribution of these three place-name endings in parts of Württemberg, Baden,

Photo by B. H. Buxton

HORB FROM THE CITY WALL, SHOWING THE STEEP TILED ROOFS OF THE HOUSES

Alsace, and northern Switzerland. The "ingen" settlements appear to have spread over the fertile uplands of Württemberg, south to the Rhine, across it, and then in a westerly direction to Basel and a little way beyond. From Basel, on the right bank of the river, they ran up north about half way to Strassburg. On the west of the Black Forest the "ingens" do not seem to have come down from the north, as there are none in Baden except towards its southern boundaries. There is another small isolated group of "ingens" in northwestern Alsace.

The "heims" appear to have spread from the north up the left bank of the Rhine as far as Basel, and, crossing the river at some points, to have mingled with the "ingens."

The "weilers" for the most part edge the mountains, and wherever they are found away from the ranges, the maps show considerable stretches of wood, an indication that in these spots the land is below the average in fertility and was avoided by the earliest settlers. In the Black Forest and the Vosges ranges themselves the place-names mostly bear some such meaning as hill, brook, wood, often with the name of some wild animal, such as boar, beaver, or deer, tacked on to them, and may be rendered as Boarswood, Beaverbrook, and so on.

### TYPES OF ANCIENT VILLAGES

The ancient "ingens" and "heims" are found in the fertile plains and rolling uplands, and present a particular, compact type of plan for the villages, which are known as "geschlossene dörfer" (closed villages), the houses being closely packed together, often very lofty, grouped around a center, which is the marketplace of the larger towns. The church does not often take a central position, but Christianity came later than the settlement.

Of a very different type are the villages of the foothills of the Black Forest; for example, on the uplands of the left bank of the Nagold. In these villages the houses lie relatively far apart from

each other, and are scattered in long rows on each side of the road running through them. Such villages are known as "reihen dörfer" (row villages), and are of much later date than the "ingens" and "heims," being attributed to the 11th century, before which time the Black Forest region had been practically uninhabited except for the "weilers" on its borders. The "reihen dörfer" do not appear to possess any specific endings, although "hardt" (wood) is a very common one, as Langenhardt, Ebershardt.

### CONSTRUCTION OF THE HOUSES

The typical house, though subject to many variations, in the closed village and more particularly in the towns, which were originally fortified, and in which space was therefore limited, is lofty, five or six stories high, built with massive wooden uprights and beams, the interstices forming the walls being filled with rubble and plaster. The house is built, therefore, upon what may be called a vertebrate plan, and foreshadows the epoch of skyscrapers, which are essentially similar in design, but in which steel replaces the wood of former days as the skeleton which supports the structure.

The steep, tiled roofs slope down over the three upper stories, so that they are all practically attics. The ground floor is generally used as a stable and cow-shed, the fenceless system of farming precluding the pasturing of cattle and sheep, which have to be stall-fed. The next two stories are occupied by the family, and the upper three stories forming the attic are devoted to storage of hay and grain, hauled up by pulleys and ropes. All agricultural produce is brought into the village or town instead of being stacked outside in the fields, a custom which may be attributed to the insecurity of early times, and has been perpetuated, although today there is no especial need for it.

The town of Calw is the best spot in the Nagold Thal for a study of these quaint, lofty wood and plaster houses, some of them dating back to the 17th century, and the village Geckingen, a visit to which should not be omitted, has some beautiful examples.

The typical house in the "reihen dörfer," on the west side of the Nagold, is not so lofty, and the walls are usually faced with shingles, as is the custom in Switzerland. Since the houses are much further apart than in the closed villages, there is not the same reason for economizing space, and the barns and stables are usually separate from the house.

### RELIGIOUS SEGREGATION IN THE TOWNS

In histories we read that Württemberg has a population of two millions, of whom two-thirds are Protestant and one-third Catholic; but a bald statement of this sort gives one no idea of the real distribution of religious belief, which to one coming fresh to the subject appears to be of a most extraordinary character. Leaving out of consideration the larger towns, which are mainly Protestant, but naturally show considerable intermingling of religions, we find that the small towns and villages are either overwhelmingly Catholic or overwhelmingly Protestant, 95 to 99 per cent on one side or the other, and on following up the boundaries between old and new Württemberg it becomes clear that the Protestant villages are in old and the Catholic in new Württemberg.

So sharply defined are the dividing lines that one may, in many places, walk from one village 99 per cent Protestant to another two or three miles off and find 99 per cent Catholics. The sketch-map shows the boundary line of Old Württemberg, just south of Nagold, with the names of the gemeinde and the number of Protestants (evangelicals) and Catholics in each.

For an explanation of the astonishing figures given in the map, one has to go back to the time of the Reformation, in the 16th century, when the religion of the people had to conform to that of their rulers. If the ruler remained Catholic he burnt all his Protestant subjects, and if he embraced the new tenets he burnt all the Catholics. As a matter of fact,

Photo by B. H. Buxton

SCENE AT ALTENSTEIG, ON THE NAGOLD RIVER

however, very few loving subjects were actually burnt, because at that time the mass of the people cared nothing for religion, but set a high value on their lives.

In many of the German states the inhabitants had to change their religion several times before settling down; but the Württemberg rulers were consistently Protestant, with the exception of a certain Duke Carl Alexander, who about 1750 proposed to introduce Catholicism into Old Württemberg again. But by that time the people had no desire to change, and had got beyond the stage of allowing their rulers to choose their religion for them, so that there certainly would have been a revolution had not the Duke's plans been nipped in the bud by his sudden death—whether natural or artificial is uncertain.

Of the territory gained by Württemberg in 1806 and 1810, almost all had belonged to Catholic rulers, and the new king wisely refrained from courting revolution or official apoplexy by trying to make his recently acquired subjects Protestants, and Catholics they have remained to this day.

Human relics of the stone, bronze, and early iron ages are scarce, and the only important historic finds date from the Alamanic period. At Gültlingen, near Wildberg, a number of the well-known row graves of the Alamans have been opened, and the beautiful metal objects found there may be seen in the museum at Stuttgart. In the guide-book to the Stuttgart Museum there are 13 places mentioned where important Alamanic finds have been made in Württemberg. Of these 13 places, 9 are "ingens," two are "heims," and only two with other endings—a proportion which seems to fit in with the theory that the "ingens" were founded by the Alamans.

### INTERESTING MEDIEVAL ARCHITECTURE

For details of the medieval remains, the guide-books must be consulted, but the ruined castle of Zavelstein, on the

Photo by B. H. Buxton

AN OLD HOUSE IN NAGOLD WHICH HAS BEEN RENOVATED

Teinach stream, as well as those of Hohennagold and Liebenzell, may be mentioned, all of them being very picturesquely situated, though not of any special historical interest.

The cloister of Hirsau, between Calw and Liebenzell, was founded in the 11th century, and possessed the largest romanesque basilica in Württemberg. The cloister became of great importance, and even after the Reformation was utilized as an evangelical cloister school. It was destroyed by the French in 1692, and during the 18th century the ruined buildings served the purposes of a stone quarry, so that there is not much left at the present time.

At Wildberg considerable remains of the old town walls are still standing, and there are some very ancient stone houses among the later wood and plaster houses, which themselves date back to the 17th and 18th centuries.

In considering racial questions, it must in the first place be borne in mind that language is no criterion of race, and secondly, that broadly speaking we may distinguish three main types in Europe.

1. *Northern.*—The Scandinavian, Teutonic, or Baltic race. Tall, very fair, blue eyes, pink-and-white complexion, dolichocephalic. Developed in the fogs of the Baltic region. Purest in Sweden.

2. *Central.*—The Alpine race. Medium height, dark, brown or gray eyes, brachycephalic. Probably of Asiatic prehistoric origin. Purest in Piedmont.

3. *Southern.*—The Mediterranean race. Short, very dark, black eyes, olive complexion, dolichocephalic. Developed in the sunny south. Purest in Sardinia.

Owing to centuries of intermingling and a hundred other disturbing factors, such as climate, quality of nourishment, and so on, these types are scarcely to be found in their original purity; but in North Germany the Baltic type is approximated, and in South Germany the Alpine type predominates. Nevertheless, in Württemberg there is a wedge running south up the valley of the Neckar in which the population approaches the

Photo by B. H. Buxton

HAULING HAY UP TO THE LOFT OF A HOUSE IN CALW

This town is the best place for a study of these quaint, lofty wood and plaster houses

Photo by B. H. Buxton

VIEW OF ALTENSTEIG FROM THE BRIDGE ACROSS THE NAGOLD RIVER

Photo by B. H. Buxton

A SEVEN-STORY HOUSE OF CALW, BUILT IN 1694

Photo by B. H. Buxton

A CITIZEN OF CALW AND HIS WIFE STORING HAY
A mass of hay has broken away from the bundle and is falling down

Photo by B. H. Buxton

A RECENTLY BUILT HOUSE IN STAMMHEIM: WÜRTTEMBERG

Photo by B. H. Buxton

GECKINGEN: WORKERS RETURNING FROM THE FIELDS FOR THEIR MIDDAY MEAL

Baltic type more nearly than the inhabitants of the Black Forest on the west or of Bavaria on the east, due no doubt to the Alaman invasion from the north. The people we encounter, therefore, in the Nagold Thal are on the whole rather tall, with fair complexion and blue eyes.

COSTUMES OF THE PEOPLE

The local costumes are rapidly being discarded and today can be better studied in the museums and on the picture postal cards than on the backs of the natives. Nevertheless a few examples may occasionally be seen *in situ*, in the Protestant districts men and in the Catholic districts women, having to some extent adhered to the old costumes.

The typical costume of the men is a long, dark blue coat with large brass buttons, the buttons being only ornamental, as the coat is always thrown open, showing a bright scarlet waistcoat, also with conspicuous brass or perhaps silver buttons. Knee breeches of yellow or black leather are worn, with either high boots or with low shoes and dark blue stockings. The hat is round, of soft, rough felt, and the general effect is very striking; but unless one observes rather closely, one does not get further than the showy red waistcoat and the brass buttons, which first catch the eye and are apt to keep it. The best example I saw was in Nagold—a man who had come in from the country for some special occasion.

The costumes of the women are not so picturesque as those of the men, the dress being of black satin, the particular cut of which would have to be described by an expert; but that part of the costume which strikes the eye is the headdress. The hair is brushed flat back over the head, and over it is worn a black satin hood tightly bound down over the head and ears by broad bands, which are tied in a bow under the chin. I saw none of these in the Nagold Thal itself, but in the Catholic towns of Horb and Villingen, to the south, one may see a few every day, worn by the older women. The younger women no longer wear this

Photo by B. H. Buxton

A PICTURESQUE STREET IN CALW

Photo by B. H. Buxton

SCENE ON BIERGASSE (BEER LANE): CALW

head-dress, and a certain baron is said to have remarked that his daughters were accustomed to pick up the latest things in hats from those they saw in church on the heads of the peasant girls.

In the Protestant town of Calw, on a market day the women from the country round all wore red or white handkerchiefs bound over their heads; but except for this there was nothing to remark in their dress. A fair sprinkling of the men showed up in their red waistcoats and knee breeches, though for the most part rather dilapidated.

# NOTES ON TAHITI

By H. W. Smith, Massachusetts Institute of Technology

*With Photographs by the Author*

SO MUCH has been written about the South Sea Islands by careful and accurate observers, as well as by those who possess the faculty of forming complete impressions in a few days, that there remains little of general interest to describe. Indeed, one must go far from the more accessible islands to find conditions approaching those so charmingly presented by Charles Warren Stoddard and by Stevenson, and the changes that have taken place will be more likely to impress the traveler than the things which have fascinated him in those authors.

While the simplicity and attractiveness of character of the native Polynesian is now much as it was in the time of Stevenson, the depopulation of the islands has continued where the natives have been unable to develop a resistance to the white man's diseases, and in other islands the increase of alien population has much changed the character of the people. The Chinese, bringing with them habits of industry from a densely settled and less productive land, have proved formidable competitors with the easy-going Kanaka, who for generations has found abundant living from the fish of the reef and the bread-fruit and "fei" of the mountains.

Tahiti, of the Society Islands, is one of the most important of the French possessions in the Pacific, with steamship connection to San Francisco and New Zealand. The hotel accommodations at Papeete, the principal town, and at a few other places, are comfortable and well adapted to tropical life, and in July many tourists visit the island to be present at the annual native festivities that occur in connection with the anniversary of the fall of the Bastile. At that time canoes from many of the neighboring islands come to Papeete, bringing crowds of pleasure-seekers, who, with their dances and songs, give the traveler a glimpse of the native life of former days.

The Society Islands are of volcanic origin, rising from the low bed of the ocean, which has depths near the islands of 1,500 to 2,000 fathoms, while the highest peak, in the center of the island of Tahiti, reaches an altitude of 7,300 feet! On a clear morning the view as the ship approaches the harbor of Papeete is most beautiful, showing deep valleys penetrating from the coast to the mountain peaks of the interior. On page 948 is a view of the hills by the coast at Papara, with the water from recent showers falling in cascades down the sides of the cliffs.

An interesting and somewhat strenuous excursion is to follow one of the valleys upward to the center of the island, and the writer made one such trip in the Waihiraia Valley. It is preferable to camp near the head of the valley, in order to have the opportunity of reaching the highest part of the trip before the clouds, which gather early, have cut off the view. Page 949 shows the spot where

Photo by Harrison W. Smith

PAPARA HILLS, ON THE SOUTH COAST OF TAHITI: AFTER A SHOWER LITTLE WATERFALLS MAY BE SEEN ON THE HIGH CLIFFS, AS IN THIS VIEW

lunch was taken and page 950 the stream by which the camp was made.

The trail up the valley is practically the bed of the stream, for it crosses and recrosses, traversing a bit of low land, first on one side and then on the other, plunging through tunnels of dense vegetation dripping with water, so that one is quite as dry wading up the stream as pushing through the high grass and tree ferns. These streams abound in fish and prawns, which the man in the picture on page 950 is in the act of spearing.

The camp was a simple affair; a rubber sheet stretched on poles would have made a good roof if it had been a couple of feet longer; but in fact it necessitated a shortening-up process on the part of the sleepers for each shower during the night. Dead banana leaves, which, hanging straight down from the stalk of the tree, are sheltered from the rains and thus become dry, were gathered for the beds.

The exhilaration of waking in the fresh morning life of the tropical forest is worth the discomfort, provided one may feel sure, as is the case in these favored islands, that no fevers have taken root during the night.

Proceeding up the valley, the sides become more precipitous, until finally the trail leaves the bed of the stream and climbs up the steep wall through great tree-ferns and tangled vines. Page 951 is a view from a point near the top of the trail, which continues on a short distance over a ridge to a pretty little lake shut in by cloud-capped peaks. On the left side of the picture may be seen the leaves of the tree-fern, six or seven feet in length, and the compact clusters of leaves of the "fei," a large variety of banana.

Photo by Harrison W. Smith

ROASTING "FEI" AND BREAD-FRUIT FOR OUR LUNCHEON IN THE WAIHIRAIA VALLEY

Near Papeete the beautiful Fatauua Valley may be visited in an afternoon. For a good part of the way a carriage road leads up the valley, offering changing vistas, such as shown on page 952. At the end of the road a foot-bridge leads across a lively mountain stream to an easy trail, which one ascends but a short distance to obtain the view shown on page 953. At the end of an hour's climb the Fatauua Falls, 600 feet in height, are seen on the opposite side of the canyon.

A native house with palm-leaf mats drying in the sun, to be used as thatch, is given on page 954. The food supply is at the door, for back of the house may be seen the serrated leaves of the bread-fruit tree. A short journey into the hills will provide several days' supply of "fei," a delicious fruit for baking, shown on the same page, and fish may be caught upon the reef.

Why, indeed, should the Tahitian toil? The picture, page 955, shows the great leaves of the wild "taro" growing by the roadside; the young leaves are delicious boiled, and the curious stranger will find many other new delicacies of the table—the alligator-pear, the baked papya, the Mantis crab, the raw fish, as good as the best oyster, served with Tahitian sauce, and, on rare occasions, a salad made from the heart of the cocoanut tree.

The photograph on page 956 shows how a little pig was brought one day for dinner, and nowhere is roast pig more prized or better prepared. A fire is built on the ground, covered with stones, and, when all is ready, the pig is carefully laid on with bread-fruit leaves to roast.

The view on page 957 is the garden of

Photo by Harrison W. Smith

SPEARING PRAWNS, WHICH ARE LARGE AND PLENTIFUL IN THE STREAMS OF TAHITI

an American who has lived for several years in Tahiti. Pineapple plants are seen in the foreground, young cocoanut trees on each side, and in the center a large cluster of the Samoan banana. It will be noticed that the tree is unusually short, but the fruit is large and of particularly fine flavor.

The man shown on page 958 is a fisherman who took the writer in his canoe to see the wonders of the coral reef, perhaps the most novel sight for the traveler in tropical islands. Early in the morning, after the land breeze has died away and before the sea breeze has ruffled the surface of the water over the shoal parts of the reef, the spectacle of brilliant-colored fish and of strange forms of coral is one of fascinating interest.

A mass of coral, photographed through the water, is shown on page 960. Near the center appear some fine white lines; these are the upper edges, bright yellow in color, of coral of delicate structure that grows in thin vertical walls. Directly below is seen a coarser, fan-shaped growth rising from the rough bottom by a thick stem. On page 959 are other forms growing on a large rock. In the deep water at the top and left of this picture may be noticed the effect of small waves in focusing the sunlight into bright bands on the bottom, while the same cause has produced a slight distortion in the image of the growing coral on the top of the rock.

From the wharves at Papeete may be seen Morea island, about 10 miles distant. There are few bays more beautiful than that of Oponohu, in this island, with the mountain Mauaroa rising 2,900 feet above the sea (page 961).

Photo by Harrison W. Smith

IN THE WAIHIRAIA VALLEY, LOOKING BACK FROM THE TRAIL THAT LEADS TO A LITTLE CRATER LAKE: THE SIDES OF THE VALLEY ARE COVERED WITH TREE FERN AND "FEI"

Photo by Harrison W. Smith

VIEW IN THE FATAUUA VALLEY

Photo by Harrison W. Smith

LOOKING DOWN THE FATAUUA VALLEY FROM THE STEEP TRAIL WHICH LEADS THROUGH THE TROPICAL FOREST TO THE FATAUUA FALLS, OVER 600 FEET IN HEIGHT

As the difficulties of photographic work in the tropics are well known, it may be of interest to describe a convenient feature of the writer's outfit—the dark-room for plates. All plates were given the 20-minute pyro development in the Eastman tank, according to the Eastman formula. Page 962 shows a suit-case that formed the body of the dark-room. The right half is occupied by a water-tight rubber bag, supported on three sides by the sides of the suit-case and on the fourth by a brass rod, which may be seen extending over the edge of the case and hooked into the lock. The developing tank, filled with developer at a temperature sufficiently below the normal to allow for rise of temperature before development begins, rests in this rubber bag, as shown. The object of the rubber bag is to prevent damage to plate-holders that are placed in the other half of the suit-case in the event of the tank spilling over.

The cover of the suit-case is held up by means of a light wooden rod at each corner, and a dark bag is then placed over the whole.

The other illustration shows how two long sleeves permit the operator to transfer the plates from the holders to the tank without the necessity of himself being in the confinement of a dark-room, a distinct convenience in the tropics, even on the rare occasions when a dark-room is available.

Photo by Harrison W. Smith

TAHITIAN BOY WITH A LOAD OF "FEI," BROUGHT FROM THE MOUNTAINS: THE GREEN FRUIT, ROASTED IN AN OPEN FIRE, IS A STAPLE ARTICLE OF DIET

Photo by Harrison W. Smith

A NATIVE HOUSE, TAHITI, WITH MATS OF PANDANUS LEAVES FOR THATCHED ROOFS DRYING IN THE SUN

Photo by Harrison W. Smith

THE GREAT TARO PLANT GROWING BY THE ROADSIDE: THE YOUNG LEAVES OF THE WILD TARO WHEN BOILED CONSTITUTE ONE OF THE DELICIOUS NATIVE DISHES

As soon as the plates are in the developer, the tank is sealed, removed from the dark bag, and placed in a wooden box lined with thick hair-felt to maintain constant temperature. During development it is important to stir the developer three or four times to prevent uneven development over different portions of the plate. Under particular conditions it is easy to find the temperature at which the process must be started in order that the average may be 65 degrees. At the end of development the cover of the tank is loosened in subdued daylight, the developer is poured off and the plates are rinsed by pouring in fresh water quickly after removing the cover, and the fixing completed in the ordinary manner. The dark bag is made of double-fabric gossamer with the seams vulcanized, and is absolutely light-tight.

A NATURALIST'S VISIT TO TAHITI

*We paid several visits to the barrier-reef, where the water was so clear that we could see everything as in a glass tank. There were many large holothurians, one of which on being captured ejected an example of the long silvery fish which has been described as living in these "sea-slugs."

The coral was covered in many places with sea-urchins, which were possessed of spines three or four inches in length, so that when walking on the reef great care had to be taken to prevent a nasty wound.

One evening we watched some natives spearing fish by torch-light. Two canoes paddled out a few yards apart until they

*Abstracted from an entertaining narrative, "Three Voyages of a Naturalist," by M. J. Nicoll. Witterby & Co.

Photo by Harrison W. Smith

A LITTLE PIG FOR DINNER

A fire is made in a small pit in the ground and covered with stones. When the fire is burned out the pig, wrapped in leaves, is placed upon the hot stones, with breadfruit and "fei," a variety of plantain. Then the whole is covered with many layers of the large leaves of the breadfruit tree and left to roast.

were exactly over the reef. A torch, composed of dead leaves of the cocoanut palm, was then lighted and waved to and fro until the fish, attracted by the glare, rose to the surface of the water and swam near the boats. Then followed a delightful exhibition of skill. A native, standing up in the bow of his canoe, would hurl his long spear at a fish as it crossed in front of him, and so deadly was the aim that even small fish, several yards distant, were seldom fortunate enough to escape. The spears were made of light wood, with five straightened fish-hooks bound in a cluster at the end.

Afterwards we all waded on the reef, attempting, in native fashion, to spear the fish as they darted about in the masses of coral; but we were not very successful and soon were glad to abandon the sport, since several of us were badly pricked by the sea-urchins, the spines of which broke off short after entering the flesh and producing intense pain.

One day our friends on shore arranged a picnic in our honor at a place called Fautawa, which was reached by about an hour's drive through magnificent scenery. The road for a great part of the way led along the edge of a mountain stream, winding through a deep valley in which Fautawa is situated. At the top of the valley there towered above us a tall peak the summit of which was composed of a series of jagged points clustered together in the shape of a crown.

Having arrived at our destination, we

Photo by Harrison W. Smith

A PRIVATE GARDEN IN PAPEETE, SHOWING PINEAPPLE AND YOUNG COCOANUT TREES AND THE SAMOAN BANANA: THE RED-SKIN BANANA IS ONE OF THE FINEST FLAVORED VARIETIES

were in time to see the last of the festal preparations made by the natives for our entertainment—the removal of the sucking pig from the oven. The oven was a hole dug in the ground and lined with large stones, which had been previously heated in a fire. Banana leaves had been placed over the hot stones; then the pig had been laid in whole and completely buried, first with the banana leaves and finally with a layer of earth. Here it had remained for an hour or more, and certainly when it was exhumed it was perfectly cooked; and, served up with plantains, it made a most palatable dish.

We were given several other native dishes, of which the most choice perhaps was the famous "cocoanut salad." This salad is made of the heart of the green top of a cocoanut tree; and, as each salad involves the destruction of a tree, it is only prepared on a special occasion.

After a few days' stay at Papeete, we were invited to pay a visit to the village of Tautira, which is reputed to be the most picturesque spot in Tahiti. We gladly accepted the invitation and got under way early one morning. Steaming close to the land, we had a fine view of the wild, rugged coast and of the high, jagged peaks, with their cloud-covered summits. Many waterfalls, looking in the distance like threads of silver, were falling sheer down the precipitous wall of rock which forms the coast in this part of Tahiti. Now and again valleys

Photo by Harrison W. Smith

A TAHITIAN FISHERMAN

would open into view, and down them sparkling rivers rushed into the sea.

It was late in the afternoon when we reached Tautira, and a boat at once put off from the shore. In it came the chief of the village, who piloted us safely through the passage in the reef. We anchored off the mouth of the small river, near the banks of which the village of Tautira is built.

The barrier-reef in this part of the island is almost awash at high tide; it is nearly semicircular in shape, and so perfectly flat on the top that, as we entered the passage, we seemed to be steaming through a gateway in a low wall.

The shore is a strip of red-colored sand, with a narrow belt of cocoanut palms. Behind the palm trees lies the village, and beyond rises a magnificent range of hills clothed to the summit with almost impenetrable forests. The houses are well built, of native pattern; the walls are made of upright bamboos, with a half-inch space between each to allow a free passage of air into the house. Rows of mats are so arranged that they can be let down to cover the walls in case of rain, while at other times they are rolled up under the eaves. All the houses are thatched with leaves of either the cocoanut palm or *pandanus*.

The surroundings of Tautira are very beautiful. The ground is covered with a thick growth of green grass, studded with *hibiscus* and other flowering plants, while orange trees grow in great profusion.

In Tahiti, as well as in most of the South Sea Islands, great numbers of cocoanuts are grown, and, after being dried for copra, are shipped in large

Photo by Harrison W. Smith

CORAL GROWING ON THE REEF: PHOTOGRAPHED IN THE EARLY MORNING, BEFORE THE BREEZE HAS RUFFLED THE SURFACE OF THE WATER

quantities to Europe. We were much interested in the different methods of gathering the nuts in various islands. In Tahiti the natives climb the trees with the help of a strip of green, fibrous bark torn off the stem of a *hibiscus* tree. After knotting the two ends together, the climber slips his feet half through the circle, and, standing with his legs apart, so as to stretch the thong tight, ascends the tree in a series of leaps, with a foot on each side of the trunk. A practiced climber will thus mount trees of a very considerable height with a celerity and ease which do not suggest the long practice actually required. On making a trial myself, I found it difficult to climb even so much as a foot from the ground.

In its fresh, green state the cocoanut provides a most refreshing drink, but as it grows older the "milk" hardens and forms the white kernel with which we are all familiar. This kernel is the celebrated copra and is commercially put to many different uses. In Tahiti it is used for sauces and for cocoanut oil. One sauce, which was served with fish at the above-mentioned picnic, although compounded of scraped nut and sea-water, was really quite palatable.

At Tautira one of the sailors brought me the dried shell of a cocoanut, which he told me was full of lizards. I at once plugged the "eye-holes" and took the nutshell on board, where a careful examination showed that it contained 136 lizard eggs, 294 empty egg-shells, and 13 newly hatched lizards. It would seem, therefore, that many females of this species repair to the same place to deposit their eggs. The eggs themselves were found to be in all stages of incu-

Photo by Harrison W. Smith

CORAL GROWING ON A REEF: THE UPPER EDGES OF THE THIN WALLS OF CORAL IN THE CENTER OF THE PICTURE ARE BRIGHT YELLOW, AND LITTLE FISHES OF BRILLIANT COLOR DART IN AND OUT AMONG THE CREVICES

Photo by Harrison W. Smith

THE PEAK MAUAROA, IN MOREA, 2,900 FEET HIGH, AT THE HEAD OF OPONOHU BAY, ON THE ISLAND OF MOREA, 10 MILES FROM TAHITI

Photo by Harrison W. Smith

SUIT-CASE USED AS A DARK-ROOM FOR PHOTOGRAPHIC PLATES IN THE TROPICS

Photo by Harrison W. Smith

THE COMPLETE DARK-ROOM (SEE PAGE 953)

bation, from "newly laid" to shells containing perfect lizards. I afterwards found several hundreds of eggs of this species in a hole in the ground, close to the sea, at Papeete. Butterflies were very scarce on Tahiti; at Papeete we met with only one species, and on a small coral island some miles from Tautira with but one more.

Mosquitoes were extremely troublesome on shore, but very few appeared on the ship until after we left the island, when we discovered that they had been breeding freely in a can of water containing a growing "ti" plant.

Everywhere along the seashore and about the villages the ground was honeycombed with the burrows of land-crabs, and in some places the whole surface appeared to be moving with these creatures. At the least alarm they popped into their holes, from which they never strayed far during the day. When chased a crab would often hurry into the wrong burrow, and be ejected immediately by the rightful owner; but the inhospitality did not help one to catch them, owing to the speed with which they vanished ultimately underground. If one stood quite still they would reappear at the mouth of the burrow, waving their stalk-eyes in all directions on the lookout for danger. I caught one by cutting it off from its burrow and driving it against a fallen tree, where it turned at bay, rolling its eyes and waving its claws in a formidable manner.

Some of the smaller species of land-crabs on these islands have yellow, others bright blue, claws, and one gains a striking impression of color when some hundreds of these crabs wave their bright claws as they run over the dried mud close to the sea.

The day before we left Tautira the ship was visited by a continual stream of canoes, which came from far and near, bringing gifts of fruit, etc., to Lord Crawford. By nightfall the *Valhalla* had the appearance of a huge vegetable and fruit market. There must have been at least a ton of bananas, oranges, plantain, cocoanuts, and other fruit on board, as well as several Muscovy ducks and a little piebald pig. When all was aboard, the chief of Tautira, one of the finest-looking men I have ever seen, made a speech, and formally presented the gifts.

At 10 o'clock the next morning we left Tautira for Papeete again, to complete our coaling, which took a long time, owing to the scarcity of lighters.

During our last day at Tahiti we were confined to the ship by one of the heaviest storms I have ever witnessed, the rain falling in such torrents that in a few minutes the streets were literally full of water.

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THE NATIONAL GEOGRAPHIC MAGAZINE

# GLIMPSES OF JAPAN

By William W. Chapin

Author of "Glimpses of Korea and China," with 39 Photographs in Colors, in the National Geographic Magazine for November, 1910

WHEN we recall the scenes of our delightful days in Japan, our minds are filled with the wonderful harmony of it all. The people, their dress, the flowers, the temples, the homes and gardens—in fact, everything seemed to fit in place like the instruments of a great orchestra.

The months of our sojourn resembled a delightful picnic, so much of our time was spent in the open, carried in the comfortable "rikishas," or the more dignified "kagos" (native basket chairs), accompanied by the ingenious native lunch-baskets. The Japanese are remarkable for their out-of-door life. Probably no people have more fête days or enter more heartily into the observance of them.

In these festivals the flowers are the most important feature. It matters little what kind is in season—the flowering plum, cherry, wisteria, azalia, peony, iris, lotus, chrysanthemum, or maple—where the flowers are, there are the people, and the evidence of their enjoyment is unmistakable.

The Emperor's cherry blossom and chrysanthemum garden parties are annual affairs, as well as that of Count Okuma, Japan's grand old man. One of the Count's hobbies is propagating and collecting dwarf maples and chrysanthemums. His collection of the former numbers 500 and of the latter 900. This national prominence given to flowers is a powerful incentive to floriculturists to attain the best possible results.

A visit to the Maple Club, in the suburbs of Tokio, was one of our pleasant experiences. Here dinners are served in the highest style of the Japanese art, and if one discovers native cooking is not to his liking, he can forget his hunger for the time being in watching the "merry whirl" of the dancing girls (see page 985), accompanied by the more sedate and less attractive geishas, whose music is as devoid of tune or harmony as the so-called dance is of dancing, according to Western ideas.

The grounds connected with the clubhouse are very attractive and formed an appropriate setting for the pretty little women, who were induced to pose before the kodak by a promise of a picture for each. Later, on delivering the prints, we were informed that we had broken the record, for this was the only time they had received the reward which many, many times had been promised.

Photos by W. W. Chapin

SEVEN STONE BUDDHAS: NIKKO

THE SEVENTY-EIGHT BUDDHAS (SEE PAGE 972)

Our excursion from Tokio to view the cherry blossoms proved a double joy, as, in addition to the wonderful display of the exquisite, fluffy bloom, resembling most delicately tinted clouds, we were afforded an unusual opportunity of studying the people in their free and easy enjoyment of the occasion (see pages 976-978).

Near the Sumida River, about seven miles from Tokio, is the Arakawa Ridge, a road raised about eight feet above the surrounding paddy fields, and bordered on either side for many miles with the double-flowering variety of cherry trees. Here, as long as the display lasts, the people gather day after day, wandering up and down, abandoned to the enjoyment of the scene. They are dressed in holiday attire, the colors of their kimonos and obis vying with those of the blossoms; so it was a toss-up which produced the most brilliant display. Numerous booths, elaborately decorated with lanterns and paper ornaments, for the sale of sake, tea, and refreshments, together with roving bands of musicians and dancers, some of them in grotesque costumes, added greatly to the entertainment of the crowd as well as ourselves.

Photo by W. W. Chapin

THE COMPASSIONATE GOD JIZU (SEE PAGE 997)

A little later the cherry blossoms were followed by the graceful wisterias (see page 994). The native sort were seen in luxuriant bloom, their long branches of delicate-tinted flowers suspended from an overhanging trellis resembling ropes of purple beads. Some of these strings of blossoms grow to a length of six feet. Japanese gardeners obtain splendid results with the variety commonly seen in our own country. The blossoms of this sort grow in thicker clusters and the color is deeper than the native variety.

Probably no flower impresses American tourists with the floral possibilities of Japan as does the wonderful display of azalias. Some of the gardens we visited contained acres of bushes, many of them higher than our heads, all a mass of bloom (see page 995). Then, too, the mountain-sides were tinted with the wild species. Dooryards and hotel grounds contained many single specimens of exquisite color and form. These out-of-door plants were even more beautiful than those raised in our hot-houses.

Regular Japanese houses in construction are frail frame affairs. The ever-present danger from earthquakes having

Photos by W. W. Chapin

TWO CHILDREN CARRYING BABIES (SEE PAGE 999)

PEASANT WOMEN CARRYING RICE

They romp and play, entirely heedless of the baby on the back

Photo by W. W. Chapin

PILGRIMS IN TEMPLE COURT: KIOTO (SEE PAGE 1001)

to be considered, no mortar, stone, or brick enters into their make-up, even underground foundation being dispensed with. The outer enclosing walls are of solid wood, and the windows and partitions are lattice frames covered with opaque paper, and all slide in grooves. This permits throwing the entire story into one room (see page 979). These doll-houses make the neatest, daintiest abodes one can imagine, and their simplicity of furnishing appeals to the American housewife as ideal. Rugless floors inlaid with thick straw mats, each three feet wide by six feet long and soft enough to form the foundation of a comfortable bed when supplemented by thick padded quilts, afford one the choice of having his bed made up in any part of the room he may prefer.

As walking on these straw mats with wooden sandals or street shoes would soon break the straw and make the mats ragged and unattractive, besides tracking in dirt, street footwear is left in the entry. In temples and inns this inconvenience to foreigners is sometimes avoided by the keepers providing felt socks to draw over the shoes.

No furniture interferes with sweeping and there is little to dust, since these sensible people do not make homes museums of art and curios. A small fireproof building is provided conveniently near, known as a go-down, in which is stored all of the surplus family possessions of bric-a-brac and valuable clothing. Some of the living-rooms have a little alcove and shelf, with a vase or a piece of bronze, a scroll hung on the

wall, a low stand; and, if the weather makes it necessary, a brazier with a few glowing charcoals is added to warm the fingers. For the sake of variety, the vases or bronzes are occasionally exchanged for others from the go-down.

The best room in the native home is placed in the rear of the house, because it overlooks the garden. How dear to the Japanese heart is the garden, where love of nature finds peculiar expression in this land of flowers, for in no other country do dooryards contain so many artistic features within so limited a space.

One afternoon, while investigating the attractions of a brass curio-shop in Yokohama, a funeral procession, wending its way along the narrow street, ascended the steps of a near-by Buddhist temple. First came four men, each carrying a flimsy artificial tree, about three feet long, representing the lotus plant in bloom. These were followed by eight coolies bearing on their shoulders two poles about 18 feet long, from which hung the coffin. When the family of the deceased is unable to bear the expense of the full-length coffin, a smaller square one is used, the remains being placed in a sitting posture. These receptacles are sometimes too small to receive the remains without breaking the limbs.

In the present case, owing to the affluent circumstances of the deceased, the coffin was of full length, its frail construction in the style of a toy Swiss cottage. The two sides were hung with bamboo curtains of so loose a weave as plainly to show the outline of the occupant, who proved to be a woman. The remains were followed by rikishas containing the mourners and friends. Wishing to see the ceremony, we followed after the procession. On reaching the auditorium, the poles from which the coffin hung extended so far into the entrance that it was difficult to gain admittance. The altars in these temples occupy so much of the room that little is left for the people. Spaces were assigned us on the floor at the right where we could sit. In front of each one stood a tray with cigarettes and a small brazier containing a live coal to furnish light for the smoker.

The mourners were kneeling on the floor at the left. Just back of the altar enclosure stood a low stand; behind this sat the high priest, a large gong at his right, and just back of him sat two other priests with a pair of cymbals. The service consisted of prayers, repeated first by one and then another, then all three in unison, with occasional readings from scrolls, all interspersed with strokes on the gong and clangs of the cymbals.

During the service the bereaved husband passed to the front of each group of friends, including our party, knelt facing each group, and bowed to the floor. This salutation was returned by all in a similar manner, as an expression of regard and sympathy.

Toward the close of the service an attendant entered, bearing an armful of paper boxes about the size of a pound candy box, filled with small cakes and confection neatly tied. Under the string of each box was a slip with heavy mourning border and Japanese characters, which our guide translated for us as follows: "Many thanks for your honorable attendance for the funeral of Sem, my deceased wife, today. Excuse for my expressing thanks here instead to call at your residence promptly. Yours respectfully, Umesuke Saiki and relative. 19th day, fourth month, 42d year, Maji."

One of these boxes was laid on the floor in front of each person, to be carried away by him. During the early part of the service those who felt disposed smoked the cigarettes provided in the trays, and partook of tea, which was also served.

Immediately after attending the Emperor's cherry blossom garden party, on April 26, we took our departure from Tokio for Nikko by rail, 100 miles north. The railroads of Japan are under government control and splendidly managed. During our months of travel over these lines, the practical benefit to travelers of the inbred courtesy peculiar to the people

Photos by W. W. Chapin

FOUR MEN CARRYING LUMBER

SCENE IN A PUBLIC PLAYGROUND: BOYS ON THE SWINGING LOG (SEE PAGE 1002)

was always apparent in the consideration shown by employees for the comfort of passengers.

There was, however, one disagreeable feature encountered in passenger coaches: there were no restrictions as to smoking, not even in sleepers, probably because most of the men of Japan use tobacco, and also a large proportion of the fair sex are addicted to the same habit. Were a non-smoking compartment provided on each train, much annoyance might be saved to the considerable number of travelers to whom the weed is obnoxious.

No dining cars are attached to these trains, but one's hunger may be very satisfactorily appeased at the larger stations by patronizing the boys who pass up and down the platform crying their wares, perhaps not in a language clearly understood by all. However, their offerings, in neat little wooden boxes bound together in pairs by a strand of bamboo, suggest something palatable to the traveler, and, be he Japanese or American, either taste will be gratified, as some of the boxes contain rice, fish, and native food, while others include broiled chicken, bread, etc., better adapted to the Occidental taste. Then, as it is extremely unsafe to drink unboiled water in Japan and we are considering what we can wash our lunch down with, another boy approaches our car window, offering a small earthen teapot containing a drawing of tea and a cup, all for two cents of our money, and as much hot water as is desired from a large supply kettle thrown in. After the lunch is finished the purchaser is at liberty to keep the teapot and cup or toss them out of the car window.

The road from the station at Nikko to the Kenaya Hotel is the principal business thoroughfare of what remains of this once prosperous city. As our party passed along the street we were subjected to the careful scrutiny of the proprietors of the numerous curio and wood-carving shops on either side of the road, who were all standing in their doorways sizing up the new arrivals with an eye to future business.

If Japanese art has surpassed all former achievements in elaborate and beautiful mausoleum buildings in Nikko, nature here has succeeded in her efforts to furnish a setting which can hardly be equalled the world over.

The old native proverb, "Do not use the word magnificent until you have seen Nikko," is none too strong. This mountainous region, said to have originally been a cryptomeria forest, many years ago was the abode of a public-spirited ruler, whose love for these trees led him to devote considerable of his large fortune to extending the bounds of the forest by planting and caring for large numbers of trees. Many miles of the highway leading from Nikko, as a result of his forethought, are bordered by twin rows of these great towering monarchs, reaching a height of from 150 to 180 feet and with trunks 30 feet in diameter. These trees, with few exceptions, are still in a vigorous condition, a fitting and beautiful monument to his love of nature.

A very narrow-gauge railroad enters Nikko near the hotel, and, although the street crossings are at grade and no whistle or bell gives warning of the approach of a train, no lives have ever been sacrificed or serious accident occurred. The line is 18 miles in length and the motive power is a frisky bullock, which flies over the track at an estimated speed of two miles an hour. The little car, when entering Nikko, is loaded with bars of copper brought from the smelter at Ashio, where the ore is mined, and, on returning to the mines, carries coke and provisions.

A stroll about a mile up the valley overlooking the clear, rushing waters of the Daiyagawa River brought us to a crude foot-bridge. Here, on the far side of the river from the thoroughfare, in the solitude of the forest, mantled in green moss, was a row of stone idols (see page 966). Our guide informed us that no one had succeeded in counting these images correctly; so our ladies,

OUR FRIEND, THE PILGRIM

A little old man on a pilgrimage to the shrine on the sacred mountain of Koyasan. As he slowly makes his way along the lonely path, he tinkles the little bell which hangs from his neck and chants the invocation: "May our six senses be pure and the weather on the honorable mountain be fair."

A SHINTO PROCESSION IN KYOTO

The marching ceremonies of the lower class of Shintoists suggest to the tourist the clown part of a circus street parade, so grotesque is the appearance of many of those taking part. It is possible that the display is most impressive to the faithful, but it conveys no religious significance to others.

A PILGRIM AT THE TEMPLE

This pilgrim has visited the shrine in the Temple, and is now ready to depart on his long tramp to the place he must visit to make his next sacrifice. The "water lantern," so-called, at the left of the pilgrim, is the most graceful in outline of all the Japanese stone lanterns.

A WAYSIDE TEA HOUSE

Tea houses in Japan are most welcome and opportune resting places in the day's journey. Visitors are usually served by young women, who not only fill the place of waitresses but are charming hostesses. At the wayside inn in the picture the old couple were most considerate of our comfort.

NUNS SOLICITING ALMS

In the right hand of each nun is a little hammer, which is used to strike the small metal gong attached to the belt to give notice of their approach, so that a person may be prepared to make a contribution. If the coin is forthcoming the nuns deposit it for the time being in the box hanging at their side.

ARÁKAWA RIDGE AND TOURISTS' RIKSHAS

One of the drives most frequented by tourists desiring to view the soft beauty of the cherry trees in blossom, and which affords a splendid opportunity to mingle with the natives who throng this magnificent stretch of five miles.

A VIEW OF ARAKAWA RIDGE

Many years ago this double row of cherry trees formed a delicate lace-like edging for the highway, which extended seventy miles, being even more beautiful than it is today.

A GROUP OF DANCERS

One of the numerous bands of musicians and dancers, who stroll up and down the Arakawa Ridge, entertaining the crowds as they promenade among the pink and white cherry blossoms.

THE INTERIOR OF A JAPANESE HOME *By permission of F. C. Hicks*

This glimpse of the interior of a bamboo-and-paper house gives an idea of how Japanese ladies enjoy their cup of tea. It is second nature for the natives to sit in this position, and they are perfectly comfortable, but Europeans find it a very different matter.

THREE LITTLE MAIDS FROM SCHOOL

The Japanese maidens are so natural and graceful in choosing their own postures for pictures that it is unnecessary to pose them to obtain artistic results.

A SCENE ON THE JAPANESE INLAND SEA

The variety of sailing craft seen on these beautiful waters includes many trading junks and fishing boats of strange and unusual form.

GEISHA GIRLS

A stone lantern, a summer-house, several iris blossoms, and three geisha girls create an artistic picture, without the slightest necessity for posing.

THE GREAT TORII AT MIYAJIMA AT HIGH TIDE

Rising from the sea, a quarter of a mile from the shore, stands this old emblem. As the traveler sails into the beautiful harbor of Miyajima, he will be impressed by the sight, and reminded that not only is the ground sacred upon which he is about to stand, but the sparkling waters of the beautiful bay as well.

THE GREAT TORII AT MIYAJIMA AT LOW TIDE

It is interesting to note the effect of the constant lapping of the waves in their endeavor to wear away the old logs where they rise above the sand.

YOUTHFUL DANCERS

There was no representative of the society for the prevention of cruelty to children in sight to interfere with the dancing of the little ones. They were very graceful, and, being clothed in kimonos and obies similar to those worn by adults, appeared much older than they were.

THE GARDEN AT FUJIYA HOTEL: MIYANOSHITA

This beautiful garden at Miyanoshita has two cascades within its narrow confines, and its quaint charm is a source of delight to the many visitors.

DANCING GIRLS

Many tourists on their arrival in Japan, wishing to obtain their first meal of native food and be entertained by the dancing- and geisha-girls, repair to the Maple Club, in Toyko. The girls in the picture are some of the graceful dancers who charm all visitors.

THE PAGODA AT MIYAJIMA

The view of the bay from this little pagoda shrine, built upon one of the steep hills on the sacred island of Miyajima, well rewards one for making the climb.

A CHARCOAL CARRIER AT NIKKO

The bundle of charcoal in the picture would be considered a large load for an able-bodied man, but this woman seemed to mind it very little, so accustomed was she to the hard work.

FISH BANNERS RAISED IN CELEBRATION OF BOYS' DAY

Of the long list of Japanese anniversaries observed throughout the realm, none receive a more spectacular celebration than does "Boys' Day," on May 5th of each year. The dwelling place of every boy who has arrived from Storkdom during the preceding year is indicated to the world by these peculiar fish banners raised on high.

THE MAUSOLEUM TEMPLE OF THE FIRST SHOGUN: NIKKO

Standing in the midst of a forest of great cryptomerias on the mountainside, in Nikko, is the tomb of Ieyasu, the first Tokugawa shogun (1542-1616), one of the greatest generals, as well as the greatest ruler, Japan has ever produced. The picture shows one of the Temple buildings which stand in front of the tomb.

A BRIDE IN A RAILWAY COACH

A young bride on a short journey, chaperoned by her mother. Those who have traveled on the railways of Japan will recognize the ever-present cuspidore, fastened to the floor in the center of the car, and over which they have so often stumbled in days gone by.

THE GOLDEN TEMPLE

In a suburb of Kyoto and encircled in a setting of beautiful pine trees stands this little gem of Japanese architecture. Its graceful lines are enhanced by the reflection in the clear waters.

THE NATIVE AMBULANCE

It would be uncomfortable enough for a person in robust health to be carried for any distance in this tomb-like contrivance; therefore the effect on one weakened by disease of being shut within such narrow confines can readily be imagined.

A DRUG STORE

No sound of a sizzling soda fountain is heard as one approaches a drug store in Japan. Owing to great danger in drinking unboiled water, hot tea is the staple beverage usually served throughout Japan in drug stores and elsewhere. It is also served in many of the large stores dealing in merchandise, the proprietor sipping a cup of tea with his prospective customer before the shopping begins.

BURDEN-BEARERS

**Tourists who visit Japan for the first time often express pity** for the burden-bearers of the country. **While most of the men would gladly accept the sympathy if expressed in yen** (coin), **they would be much amused at the thought of deserving commiseration, so accustomed are they to the work.**

A PEASANT CARRYING BARK

The woman in this picture seemed to us especially deserving of pity because the weight of the load looked so out of proportion to the little body supporting it.

WOMEN CARRYING WOOD ON KOYOSAN MOUNTAIN

Horses are almost unknown in the mountainous parts of Japan, and the roads are not adapted to wheeled vehicles, so everything has to be carried on the backs of the people.

A MOTHER AND BABE

When a Japanese mother goes out she generally takes her baby with her. This picture shows a young mother about to enter the Temple, where she will ring a bell to arouse the sleepy god, that he may pay attention to her, and then offer up her prayers.

WATCHING A "KODAKER"

In some localities Americans are objects of courteous curiosity to the townspeople, especially when taking photographs.

PEASANT WOMEN AND THEIR BURDENS

The women burden-bearers of Japan do not seem to regard their lot as especially hard, even when the child suspended from the shoulder has to be carried along with the two baskets hanging from the pole; for is there not a possibility that some day the little one may become ruler of Japan!

*By permisston of F. C. Hicks*

UNDER THE WISTARIA

Japanese gardens having trellises of this peculiar variety of wistaria are most beautiful, and the long pendulous clusters of shaded purple blossoms, suspended like ropes of beads, sometimes grow to a length of six feet. The American variety of this magnificent climber was named in honor of Caspar Wistar, an eminent American anatomist.

THE AZALIA CORNER IN A JAPANESE GARDEN

The relationship between the Japanese and their flowers is strongly suggestive of the bond that exists between parent and child: patient, affectionate care, pride in their success, and pleasure in their companionship.

A GROUP OF NURSES WITH THEIR LITTLE CHARGES, AND TWO MENDICANT NUNS

From a tourist's viewpoint, most of the young women of Japan appear to regard life and its burdens as a huge joke, or at least they seem bound to look cheerful.

who straightway set about the task of settling the matter once for all, soon announced the number as 78, but were told they were wrong. After recounting several times with the same result, they were informed they had omitted the shadows in the count.

The temple and mausoleum of the first Shogun in Nikko (see page 987), built in the 17th century, located on the side of a mountain, surrounded by a magnificent grove of cryptomerias, probably comprises the finest examples of ancient architecture in Japan. Each individual building is a gem and has features of especial interest, including exquisite carving, massive tiled roofs, and wonderful bronze and lacquer work.

Throughout this big wood were scattered little temples and shrines in large numbers showing indications of great age. Many of the presiding images were prostrate, with arms and sometimes head separated from the body, all bearing evidence of disastrous conflicts with the evil spirits they were placed here to repel.

On the mountain far above the old tombs winds a narrow trail, which leads from the back country. The peasant woman bearing a load of charcoal on her back (see page 986) had carried her burden three miles. On delivering it to its destination, one mile further on, she was to receive the equivalent of 15 cents for the service.

One of the most enjoyable parts of Japan from our point of view is the mountainous region of Miyanoshita, four hours' journey from Yokohama by steam railway, electric tram, and rikisha. The hamlet is located well up on the side of a mountain overlooking the valley through which races a saucy little stream. To those fond of hot-water baths, the Fujiya Hotel, at Miyanoshita, is most attractive, since the waters of the hot springs which have made the place far-famed are on tap in each guest-room of the hotel.

From here the distant mountains afford vistas of rare beauty, but one has only to turn his gaze to the rear of the hotel for a nearer picture, which will hold him entranced (see page 984). Through the typical Japanese garden a rushing stream of crystal water tumbles over the rocks, the wild azalias adding their brilliant hues, and the *tout ensemble* making a fit setting for the dainty little proprietress, whose presence completes the charming scene. Soon after retiring, on the night of our arrival at the Fujiya Hotel, we were startled by a distant jarring and rumbling sound, which appeared rapidly to approach the house. Soon one side of our room became involved; then, with increasing violence, the opposite side, until the entire building seemed to be tumbling. On rushing into the hall, the proprietor was met, who, perfectly calm and undisturbed, remarked that it was only an earthquake, a frequent occurrence in that locality. This was reassuring for the time being, until reminded that earthquakes caused the loss of 30,000 lives in 1703 and twice that number in 1855 in the city of Tokio, only about 60 miles distant, and that geologists had stated that the very ground on which we were standing was forced up out of the depths of the sea by seismic and volcanic agencies, with no assurance that it was not at that very moment considering returning into the depths again.

This little Empire seems to have more than its share of underground activity, since estimates based on the records of former years indicate that just an ordinary crop should produce 500 jars of quakes per year, or nearly one and one-half shakes each day, and there are 51 active volcanoes on the island.

From Miyanoshita delightful excursions are made to the surrounding towns on the native chairs. Many tourists visit the beautiful Lake Hakone region, where Fujiyama, Japan's greatest sacred mountain, is frequently caught admiring its own snowy nightcap, gazing down into the mirror-like waters of the lake from its height of 12,365 feet above. About half the distance from Miyanoshita, a few steps to one side of the road, cut in relief on the face of a great rock which

forms part of the mountain, may be seen one of the best examples of earlier Japanese carving, a representation of the compassionate god, Jizo (see page 967).

The city of Kioto has the unusual distinction of having been a capital city for 1,100 years. It is finely located on the side of a hill in a region of great natural beauty. Nine hundred temples are within its borders, and probably no Japanese city can boast of a larger number of curio shops with such interesting contents.

The native bamboo box-shaped affair shown on page 989, which bears its suffering occupant through the streets of Kioto, in no way suggests the up-to-date automobile ambulance which rushes through our streets on its life-saving mission, although both are used for the same purpose. The two bearers of the litter handled their burden with extreme care to avoid jarring the sufferer, and, as the load taxed their strength, frequent stops were made to rest and shift the burden to the other shoulder. On these occasions the short pole carried by each man is placed upright under the long one, to support the weight and avoid resting the car on the uneven ground.

A considerable portion of the people of the Island Empire belongs to the class who "go down to the sea in ships," which probably accounts for the unique form in which the old pine in the center of the court of one of the temples in Kioto has been trimmed (see page 1000).

It is not uncommon to hear the remark that Japan has become a Christian nation. The belief that her Christian progress must have kept pace with her wonderful strides in other directions is probably responsible for this. However, facts will not bear out the statement. In its efforts to evangelize Japan, or even to bring her to that state of christianization where as a people she could be classified among Christian nations, the church is confronted by conditions which will require Herculean efforts to overcome. Buddhism, which for centuries has held such a powerful grasp on the Japanese, has awakened from its lethargy and is now making aggressive advances. Also Shintoism, the religion of the state since a very early period, though with absolutely no moral teaching—the only requirements from followers being embodied in the two rules, "Follow your natural impulses and obey the Emperor's decrees" and "Worship and make offering once each year at a temple"—has a strong hold on the people, as evidenced by their numerous visible gods, thousands of magnificent temple buildings, schools, priests, festivals, and processions, with all their attending pomp and display, which so strongly appeal to this people born and bred in the faith.

In the city of Kioto alone, with a population of about 450,000, there are three times as many Buddhist priests as the Presbyterian Church has ordained men in the mission field of the entire world. When we consider these conditions in comparison with the few missionaries, the small number of church and school buildings, with their limited equipment, and the unobtrusive, unspectacular methods which characterize the followers of the Man of Calvary, is it to be wondered that progress is slow and discouraging to the devoted people who have given their lives to His work? On the other hand, it is quite remarkable that in the face of so many obstacles, after 50 years of work in Japan, self-supporting and self-propagating native Christian churches have been launched in all of the larger cities, and that many educational institutions are scattered throughout the realm, such as the Doshisha College in Kioto and the Aoyama Gakuin in Tokio, and all of these as the direct result of missionary effort.

We are frequently asked, "Is the Japanese distrust of the honesty of their own people so great that positions of trust are given to Chinamen?" Our attention having been called to this subject previous to sailing to Japan, we were throughout our stay interested observers of the situation, with the result that we were unable to discover the slightest foundation for the insinuation and were informed that no Chinamen are employed

Photo by W. W. Chapin

THE WAY WE ASCENDED KOYASAN (SEE PAGE 1001)

in Japanese banking houses. Tourists who reported to the contrary probably based their statements on observations made in the Hongkong-Shanghai Banking Corporation, where their letters of credit were payable. This institution is a Chinese-English bank, and would naturally employ only its own countrymen.

In recognition of Shintoism as the state religion, the Emperor every year, about the middle of May, sends a representative to Kioto bearing a message engrossed on a scroll. The imperial document is conveyed in this form to avoid the Emperor's personal attendance.

Our arrival in that city was timed so that we might witness the interesting event. Although we were unable to appreciate much of the significance of the strange scene, it was a rare opportunity for studying the people, who were there in great numbers, including many farmers and peasants from the interior, and all in holiday attire. The variety of colors in the bright sunshine reminded one of views in a great kaleidoscope.

The procession preceding the ceremonies consisted of priests, horsemen, and footmen, many of them wearing ancient costumes and armor of feudal times, with an occasional float decorated with brilliant blossoms, while the imperial message was borne in a large cart, handsomely decorated in gilt and bright colors, and drawn by two jet black bullocks (see page 974).

The children of Japan begin to take up life's burdens and cares at a much earlier period of their existence than the children of America. Be they boy or girl, from the age of four or six the newer baby of the family becomes almost their constant companion. In fact a close attachment suddenly develops, which daily fastens the little tot on the back of the other (see page 968). As both become accustomed to the situation a mutual love and fellowship springs up, and no inconvenience is expressed, even when the older is romping and playing tag, all unconscious that the little head behind is helplessly bobbing around as though about to drop off while baby sleeps.

Photo by W. W. Chapin

A PINE TREE TRIMMED TO THE FORM OF A BOAT (PAGE 998)

Whether it is contrary to the nature of Japanese babies to cry or the shaking up by their little nurses was satisfying to them and kept them quiet was not apparent, but we do not recall a single instance of having heard a baby cry while on the back of its little nurse.

When there is no older child in a family to care for the newcomer, a nurse-girl is employed; but even then baby does not ride out in a perambulator, for that conveyance is reserved for the use of father or mother. A bevy of these young women, neatly clad in bright kimonos, each one carrying her charge on her back and all chatting and laughing at the same time, formed a frequent and attractive street scene (see page 996).

It is said that the nuns of Japan comprise two classes, the one devoted to the relief and comfort of the sick and suffering, while the other (see page 975) is practically a public charge, being most successful beggars, going from door to door intoning prayers, tinkling the bell and little gong.

The Golden Pavilion (see page 988), the exterior of its third story being in gilt and from which it gets its name, was originally built in the 14th century and recently restored. It stands on the edge of a little lake surrounded by pines, forming one of the suburban beauty-spots of Kioto. The graceful lines of the building suggest the pagoda form, with the upper roof crowned by a bronze figure of the phœnix.

We were greatly favored one afternoon, when en route from Kioto to Gifu, by the entrance in our car of a bride accompanied by her mother. She was gowned in five kimonos, the different colored facing of each garment plainly indicating the number. We were informed that the wearing of these robes was not for protection from the severity of the May weather, but to avoid the necessity of a Saratoga trunk.

Some of the hair ornaments worn by the bride were in style many years ago, but now are seldom seen. The band of pink silk covering her hair is said to be worn to prevent the growth of the horns of jealousy, so unbecoming to a bride.

By the sweetening influence of some chocolate and the promise of a copy to send to a soldier brother, our interpreter obtained permission to take her picture (see page 988).

As lovers of nature we felt amply repaid for the hardship of the long but interesting ride to the summit of the sacred mountain, Koyasan, four miles of the route by rikisha and ten miles carried in native baskets, known as kagos (see page 999), each one hung from poles on the shoulders of three coolies. This means of conveyance with a Japanese passenger appears to the observer extremely comfortable, but if a foreigner can ride a mile in one and still look pleasant he must have an unusual make-up.

The trail to Koyasan leads up a very steep but marvelously beautiful mountain, the last four miles being through a forest of enormous cryptomeria and cypress trees. There being no inn, our courier obtained accommodations for us in the Buddhist temple Shojo Shin-in. We were supplied with wholesome native food cooked and served by acolytes. These embryo priests made up our beds on the floor and in every way looked after the comfort of the party during the three days of our stay. Several of the temples on Koyasan Mountain are among the oldest in Japan, dating back 1,100 years, and are more beautiful than many of the modern buildings. Among the most attractive of these buildings is the artistic old tower which shelters the great bronze bell, which has boomed out the hours for centuries.

In parts of Japan members of associations of the poorer classes contribute a small sum monthly to a common fund. At a stated time several persons are chosen by lot to represent the rest in a pilgrimage to certain shrines (see page 969), all expenses being paid by the association. When en route to Koyasan we overtook one of this class, the old fellow (shown on pages 973 and 974), with staff in one hand, tinkling bell in the other, slowly trudging up the steep incline to fulfill his obligation at the shrine on the summit of this sacred mountain.

The narrow strip of woods comprising the old burial ground, near the temples on Koyasan, is a mile in length, and, from the great numbers of monuments and tombstones crowded into the space, "standing room only" must be the rule. Kobo Daishi, the most celebrated of Buddhist saints, founded this cemetery in the ninth century, and, owing to his tomb being within the enclosure and the special privileges in the hereafter believed to be derived from even a nominal burial beside this godly man, all the great families of Japan are represented in the great collection of stones; not that their remains are actually interred here, a tooth or any part of the anatomy being sufficient to gain the coveted benefit.

The funeral tablets of those represented in this burial place stand in rows of thousands along the wall of the memorial hall in the temple. Daily service is conducted at this shrine at 5 o'clock in the morning. The officiating priest extended an invitation to attend this service the morning after our arrival. The hour had arrived before we were awakened, and, not wishing to miss any part of the service, little time was devoted to dress.

On entering the hall the 11 priests and acolytes, with heads shaven, their feet bare, and robed in vestments of two shades of yellow, were kneeling in prayer. The entire service was intoned on one note, but each priest was singing in a different key, punctuated with the occasional clang of cymbals and the rich, deep tone of the great gong. The combination formed a most weird and remarkable harmony, which, together with the surroundings and the hour, contributed to the impressiveness of the service.

Conspicuous among the few shops in Koyasan village is the drug store (see page 989). The entire front of the store is hung with vertical signboards, calling attention to the great variety of remedies and goods dealt in. These signs, being hung with hooks and eyes, are easily taken down at closing time.

The good-roads movement, which has made such progress in our own land since the automobile became popular, has not yet reached the interior of the Mikado's realm, so everything has to be carried on the shoulders or back. In our observation most of the burden-bearers were women. The reason for this was not apparent, and was certainly not because of any inclination toward laziness on the part of the men, for they all work in Japan. On some of the mountain trails picturesque though pathetic instances of the overloading of the little women were occasionally met.

Little is known of the origin of the "torri." Some writers claim its form is a derivation of the Chinese character meaning heaven, and that it was introduced into Japan with the Shinto cult, while others state that it was originally a perch for the sacred birds. The torri is one of the most picturesque objects peculiar to Japan. It marks the approach to both Shinto and Buddhist temples, those belonging to the former being sometimes distinguished by a piece of rope stretched along the cross-beam, which symbolizes purity. To this rope is also attributed the power of protection from evil spirits.

A large and most picturesque torri is at Miyajima, the sacred island of Japan. Standing out in the sands a quarter of a mile from shore at high tide, it is a very conspicuous object in the beautiful bay. If attractive in the daytime (see page 983), it is doubly so under the light of the moon (see page 982).

The swinging log (page 971) proves that the playground movement is not confined to America. This novel amusement was very popular with the youngsters of Nara, and some of them were quite expert in keeping their footing when it was in motion.

Throughout Japan May 5 has a peculiar significance. This is indicated by the strange baglike fish banners seen floating from the flagstaffs, distended to their full size by the wind. The banners proclaim that some time during the preceding 12 months the stork has made a visit and left a small boy, and the friends of the family have greeted him with carp flags instead of flowers (see page 987).

Judging from the numerous homes displaying these emblems, his storkship must have worked overtime. Various reasons are given why the carp, of which our goldfish is a variety, was chosen for this purpose. On the occasions of large dinners, as an especial feature, a live carp is served on a board, each guest cutting a piece, which is afterwards eaten raw. The fish is said to endure the carving without a flinch, which makes him an emblem of bravery. His other qualification lies in his ability to swim a stream against the current, even to ascending a waterfall, symbolizing that he overcomes every obstacle.

If we criticise the Japanese in some of their ways, the fact remains that in many directions we could very profitably profit from them; for, all in all, where can be found a more happy or contented people? Two elements which contribute much to this condition appeared to us to be the simple life, which is so much talked of but so seldom realized in our own land, and their love of the beautiful in nature and considerateness for others, as evidenced in their extreme courtesy.

# THE KINGDOM OF FLOWERS

## An Account of the Wealth of Trees and Shrubs of China and of What the Arnold Arboretum, with China's Help, Is Doing to Enrich America

By Ernest H. Wilson

THE Chinese Empire is frequently referred to as the "Flowery Kingdom"; but, as the Chinese language indicates "words" and "children" as "flowers," the vegetative wealth of the country may not be intended. However, be this as it may, I hope in the course of this brief article to show that much of China proper is a real kingdom of flowers.

Since the dawn of culture in China, away back when the ancestors of modern nations were untutored savages, the people of the Celestial Empire have been fond of flowers. An odd plant is to be found in the dwellings of the poorest class, and the courtyard of the shopkeeper and inn-keeper always boasts a few plants of one sort or another. The temple grounds are frequently most beautiful, and attached to houses of the cultured and wealthy are gardens often of much interest. In the neighborhood of wealthy cities like Soo-chow, Hancan, and Canton are gardens famed throughout the length and breadth of the Empire.

In these Chinese gardens, as in Japan, a love of the grotesque predominates, and the landscape effect is essentially artificial. The Japanese have carried their skill in this direction very much farther than the Chinese, but undoubtedly the art originated in China.

The Chinese do not cultivate a very great variety of plants, and the subjects found in any good garden are common to all such gardens. To all the plants they cultivate, the Chinese attach some peculiar significance and value them accordingly. Purity of color and form, gracefulness in habit, and delicacy in fragrance are the qualities chiefly appreciated. Moutan pæonies, chrysanthemums, flowering peaches and plums, winter-sweet (*Chimonanthus fragrans*), heavenly bamboo (*Nandina domestica*), sacred lily (*Narcissus tazetta*), lotus lily (*Nelumbium speciosum*), lan-hwa (*Cymbidium sinense*), kuei-hwa (*Osmanthus fragrans*), bamboos, various conifers, camellias, and azalias are general favorites, and some or all are to be found in every Chinese garden. Though the cultural skill consists very largely in dwarfing and training these plants into grotesque shapes, it in no sense robs the flowers of the qualities attributed to them by the Chinese. The figuring on Chinese porcelain (and what porcelain can approach this marvelous product of Chinese skill?) is symbolical of the Chinese love of the grotesque and beautiful among flowers.

China is a land of contrariety—a land where no general statement or observation holds good. In spite of their love for grotesque and artificial landscape effects in their gardens, the Chinese have a strong appreciation of natural beauty. This is evidenced in the sites chosen for their temples and shrines. Apart from situation, which is perfect, groves and avenues of magnificent trees are often planted.

### THE MAIDEN-HAIR TREE

Though a few deciduous trees are usually to be found, evergreens always have distinctive preference. In the temples around Peking are noble avenues and woods of arbor-vitæ (*Thuya orientalis*), elm (*Ulmus pumila*), and sophora (*S. japonica*); in the south, center, and

Photo by E. H. Wilson, Arnold Arboretum

A BEAUTIFUL MAIDEN-HAIR TREE (*Ginkgo biloba* Linn.): TREE 90 FEET BY 24 FEET: NEAR KIATING, 1,100 FEET

The ginkgo is one of the most ornamental broad-leaved conifers known. It is the last survivor of a very ancient race (see page 1006)

Photo by E. H. Wilson, Arnold Arboretum

GLEDITSIA: TREE 50 FEET BY 6 FEET, NEUTER FORM: ICHANG, WESTERN HUPEH

It is a relative of our common honey locust. The boards are votive offerings to the healing spirit that is supposed to dwell in the tree

west of the Empire, pine (*P. Massoniana*), China fir (*Cunninghamia sinensis*), cypress (*Cupressus funebris*), nan-mu (*Machilus nanmu* and allied species) (see page 1015), wintergreen (*Xylosma racemosum*) (see page 1008), banyan (*Ficus infectoria*) (see page 1014), and a few other kinds of trees are always present. Many of these trees are extremely rare, except in the precincts of these religious sanctuaries.

The most noteworthy example of this is the maiden-hair tree (*Ginkgo biloba*). This strikingly beautiful tree is associated with temples, shrines, courtyards of palaces, and mansions of the wealthy throughout the length and breadth of China, and also in parts of Japan. But it is nowhere truly wild, being a relic of a very ancient flora. Geological evidence shows that it is the last survivor of an ancient family, which flourished during Secondary times, and can even be traced back to the Primary rocks. In Mesozoic times this family played an important part in the arborescent flora of north-temperate regions. Fossil remains, almost identical with the present existing species, have been found, not only in this country and Europe, but also in Greenland (see page 1004).

Though today Chinese gardens, nurseries, and temple grounds do not contain anything new in the way of ornamental or economic plants, it was otherwise up to the middle of the last century. Our early knowledge of the Chinese flora was through plants procured from these gardens, notably those around Canton. These plants were brought to Europe by trading vessels, especially those of the East India Company, at the end of the 18th and early in the 19th centuries. Different patrons of horticultural and botanical institutions in England lent assistance, and collectors were despatched to investigate and send home all they possibly could.

By these means our gardens first secured the early varieties of roses, camelliias, azaleas, greenhouse primroses, gardenias, moutain pæonies, chrysanthemums, etc. It is true we have developed most of these almost beyond recognition, and the Chinese are acquiring new forms and varieties from us, yet without these early arrivals from Chinese gardens how much poorer our gardens and conservatories would be today!

In those days, though only about a century ago, that part of the world was loosely spoken of as the "Indies," and this geographical blunder is perpetuated in the specific name "indica," given to many of these plants. In the middle of last century many ornamental plants were received from the gardens of Japan. Botanists, assuming in ignorance that these were natives of the country, gave the specific name "japonica" to many plants which subsequent knowledge has conclusively proved to be natives of China and cultivated only in Japan.

The limited knowledge Occidentals have of China and things Chinese has been acquired slowly, painfully so. It is odd that one of the oldest of civilized lands should be almost the last to come within reach of the explorer, surveyor, and naturalist. The exclusive policy of the Chinese has, of course, been mainly responsible for this, but Occidental indifference and ignorance have helped. Good old Ser Marco Polo told the world and our forebears 500 years ago of this land, but it is only within the last 50 years that the world has begun to listen and believe this wonderful traveler of old!

Our knowledge of the marvelous richness of the Chinese flora has been very slowly built up. Travelers, missionaries of all denominations, merchants, consuls, maritime customs officials, and all sorts and conditions of people have added their quota; but, as in geography and other departments of knowledge relating to the Far East, the Roman Catholic priests have done most. The exclusive policy of the Chinese has necessarily increased the difficulties, and all honor is due to the workers in the past.

Robert Fortune, in the forties and fifties of last century, on behalf of the

Photo by E. H. Wilson, Arnold Arboretum

PRIMROSE (*Primula sinensis* Sab.) AT HOME: SAM YU TUNG GLEN, ICHANG:

From China our gardens first secured the early varieties of roses, camellias, azaleas, greenhouse primroses, gardenias, moutan pæonies, chrysanthemums, etc. We have developed most of these plants beyond recognition, and the Chinese are now requiring new forms and varieties from us. Yet without these early arrivals from Chinese gardens our conservatories and gardens would be very poor today.

Photo by E. H. Wilson, Arnold Arboretum

A REMARKABLE BROAD-LEAVED EVERGREEN (*Xylosma racemosum* Miq.): TREE 55 FEET BY 6 FEET: PLANTED AMONG THE SNOW-COVERED GRAVES: NEAR ICHANG

China possesses a greater variety of trees than the whole of North America, and of ornamental shrubs has more varieties than are to be found in the temperate flora of all other lands. Many of her ornamental trees and shrubs are suitable for cultivation in the parks and gardens of the United States. The broad-leaved evergreens of China, of which a wonderful example is shown in the above photograph, would add immensely to the beauty of our landscape. It is hoped that several varieties will be found able to thrive in our American climate.

Royal Horticultural Society of London and others, completed the work of his predecessors and exhausted the gardens of China to our lasting benefit; but the difficulties of travel were such that he had practically no opportunity to investigate the natural wild flora. With the exception of perhaps half a dozen plants, everything he sent home came from gardens. But one of his wildlings—*Rhododendron Fortunei*, to wit—has proved of inestimable value to rhododendron breeders across the water.

Charles Maries, collecting on behalf of the London house of Veitch, in 1879, ascended the Yang-tse as far as Ichang. He found the natives there were unfriendly, and, after staying a week, during which time he secured *Primula obconica*, one of the most valuable plants of today, felt compelled to return. Near Kiukiang he secured *Hamamelis mollis*, *Loropetalum chinense*, and a few other plants of less value, and then hied himself away to Japan.

For some curious reason or other he concluded that Robert Fortune had exhausted China, and, most extraordinary of all, his conclusions were accepted! When at Ichang, had he gone some three days' journey north, south, or west he would have secured a haul of new plants such as the botanical and horticultural world had never dreamed could possibly exist anywhere on this planet. By the irony of fate it was left for two or three others to discover and accomplish, at a later date, what was almost within his grasp.

The enormous population, especially in the vicinity of the Lower Yang-tse and its vast alluvial delta and plains, no doubt misled Charles Maries, as it has done others. So densely is China populated that every bit of suitable land has been developed under agriculture. A Chinese is calculated to get more returns from a given piece of land than the most expert agriculturist in any other country. Dry farming and intensive cultivation, though unknown to them under these terms, have been practiced by Chinese from time immemorial. The land is never idle; they are always tilling and manuring the soil. Nevertheless, in spite of their almost incredible industry, much of the land in the wild mountain fastnesses of central and western China defies agricultural skill, and in these regions a surprisingly rich and varied flora obtains. These parts are very sparsely populated, difficult of access, and, until comparatively recently, totally unknown to the outside world.

The botanical collections of Fathers David and Delavay, and of Augustine Henry, of the Maritime Customs, gave the first true insight into the extraordinary richness of the flora of central and western China. Delavay's collection alone totaled about 3,000 species, and Henry's almost if not quite equalled it! Botanists were simply astounded by the wealth of new species and new genera in these collections. A completely new light was thrown on many problems, and the headquarters of several genera—for example, Rhododendron, Lilium, Primula, Pyrus, Rubus, Rosa, Vitis, etc.—heretofore attributed elsewhere, was shown to be China.

### SOME OF CHINA'S BROAD-LEAVED EVERGREENS ARE MUCH DESIRED FOR AMERICA

There is a greater variety of trees, for example, in China than in the whole of North America. In the matter of ornamental shrubs, it is China first and the temperate floras of other lands nowhere!

The flora of China is, generally speaking, a temperate flora, and its great interest and value lies in the fact that it is rich in ornamental trees and shrubs eminently suitable for outdoor cultivation in parks and gardens of this country and Europe. Though a few will withstand our bleakest and severest climate and many are suitable to the climate of our warmer States, the majority find themselves at home in New England, where the climate is no more severe than in Massachusetts. As far as deciduous trees and shrubs are concerned, our hot

Photo by E. H. Wilson, Arnold Arboretum

(*Paulownia imperialis* S. and Z.): TREE 50 FEET BY 5 FEET, IN FLOWER: CHIU TING SHAN, WESTERN SZECHUAN

The beautiful lavender flowers make it a showy ornamental tree for parks

Photo by E. H. Wilson, Arnold Arboretum

MANDARIN ORANGE (*Citrus aurantium* Linn.): TREE 15 FEET, LADEN WITH RIPE FRUIT: BANKS OF YANG-TSE RIVER

To China we owe the parents of our oranges, lemons, grapefruit, citrons, peaches, apricots, European walnut, and other valued fruits

Photo by E. H. Wilson, Arnold Arboretum

THE AUTHOR'S CARAVAN, WHICH CROSSED FROM KUAN HSIEN TO TACHIEN LU VIA THE TRIBES' COUNTRY, A DISTANCE OF APPROXIMATELY 330 MILES

"Dr. Sargent's enterprise has resulted in the acquisition from China of some thousands of seedlings, covering about 1,200 species of plants new to cultivation. These embrace ornamental trees and shrubs, evergreen and deciduous in character; new lilies, iris, pæonies, and other striking herbs; new conifers of probable value as timber trees for afforestation work, and many economic plants valuable to the plant-breeder as a source of new races of fruits, more especially berries."

sun and fine autumns render it possible for us to obtain better results than across the water in England. With broad-leaved evergreens, on the other hand, the advantage is enormously with English gardens. Our hot sun in March and early April and drought in summer are too much for these evergreens. Though in the northern Atlantic States we are rich in deciduous trees and shrubs, our poverty in broad-leaved evergreens is most marked. If China can only give us half a dozen of these much-desired, hardy evergreens, what a gift it will be! There are reasons for being hopeful, if not sanguine.

### DR. SARGENT'S SPLENDID CONTRIBUTIONS

One of the very first to appreciate the wealth of China in trees and shrubs was Dr. Charles Sprague Sargent, director of the Arnold Arboretum, of Harvard University. This famous dendrologist has, during his lifetime and by his own efforts, got together in the Arnold Arboretum a collection of trees and shrubs far in advance of anything else on this continent, and, indeed, second to none extant. He quickly realized the enormous possibilities opened up in China, and set about to find means of acquiring as many of these new and desirable plants as possible. A man of fixed purpose, his efforts, once bent in this direction, never relaxed, and today tangible results in the shape of thousands of seedling plants are to be seen in the nurseries of the arboretum. Dr. Sargent received his first collection from China, in 1881-1882, from Dr. Bretschneider, of the Russian Legation, Peking. This collection, though small, contained many plants of striking value, and one and all proved hardy in the arboretum. In the early nineties Dr. Sargent himself visited Japan and North China and collected many seeds of plants for the arboretum. Various small collections have since reached the arboretum, notably one made by Professor Jack, in Corea.

The writer's exploration work in China began early in 1899, and was in the interest of the famous London nurserymen, Messrs. Veitch, of Chelsea. Dr. Sargent was largely instrumental in starting this expedition, and in 1906, when Messrs. Veitch gave up the work, my services were secured on behalf of the Arboretum.

Dr. Sargent's enterprise has resulted in the acquisition of some thousands of seedlings, covering about 1,200 species of plants new to cultivation. These embrace ornamental trees and shrubs, evergreen and deciduous in character; new lilies, iris, pæonies, and other striking herbs; new conifers of probable value as timber trees for afforestration work, and many economic plants valuable to the plant-breeder as a source of new races of fruits, more especially berries. These new introductions include not only new forms of genera already known to us in this country and Europe, but also several entirely new genera.

For the purpose of study, a large collection of dried specimens, covering some 50,000 or more sheets, has been made, and will later find homes in the various national Herbaria of the world. The work accomplished has therefore not only a national, but an international value. In addition to the above, a large collection (over a thousand) of photographs has been made. These photographs (a few of them are here reproduced to illustrate this article) represent many of the interesting trees of central and western China, and give the first real idea of the scenery and general features of that part of China. To students of plant ecology they are of immense value.

### RAZOR-BACKED RIDGES AND DEEP DEFILES

Now, before entering on any detailed account of the flora, a brief general description of the country may be of interest.

Central China consists of an irregular mountain mass broken up into razor-backed ridges and deep defiles, with the main watersheds running more or less east and west. These ridges average 5,000 to 7,000 feet and rise to 10,000 feet in their highest points. North and south of Ichang the country is broken up

Photo by E. H. Wilson, Arnold Arboretum

AN IMMENSE *Ficus infectoria* Roxb.: WAN HSIEN, YANG-TSE RIVER

The tree trunk is 50 feet high by 15 feet thick; head 90 feet through. This tree belongs to the great fig family, to which the Banyan tree and the common rubber plant of our houses belong. We have no American tree like it

Photo by E. H. Wilson, Arnold Arboretum

TEMPLE, WITH BAMBOO (ON THE LEFT) AND NANMU TREES (*Machilus nanmu* Hemsl.): KUAN HSIEN, WESTERN SZECHUAN: 2,700 FEET

The Nanmu tree furnishes one of the most valuable woods in China, used for temples and coffins. The Chinese have a strong appreciation of natural beauty, choosing the best sites for their temples and shrines, which are always adorned with rare and noble trees.

Photo by E. H. Wilson, Arnold Arboretum

"A BIT OF THE MAIN ROAD": BAMBOO GROVE AND SHRINE IN DISTANCE, NEAR CHENTU CITY

in the wildest manner imaginable. West of this town the world-famous gorges of the Yang-tse River extend for 140 miles.

This mighty river has cut its way through mountain spurs running at right angles to its course and produced gorges presenting wondrous and awe-inspiring scenery. The cliffs are mostly of hard limestone, often a thousand or more feet sheer, with their summits worn into crenulated and castellated peaks, of the most grotesque form and shape. Through these mighty gorges, narrowed to a quarter of its usual width, with a summer rise of a hundred or more feet, its course broken here and there by rapids of alarmingly dangerous nature, the mighty river rushes. At times no craft can stem its currents, and at all times navigation through these gorges is exciting and dangerous.

### DOES CHINA CONTAIN MOUNTAINS HIGHER THAN MT. EVEREST?

The far west of China and the Chino-Thibetan hinterland is even wilder than in the central parts, but the watersheds run north and south. These wild, razor-backed ranges, separated by narrow valleys and deep defiles—across which it is frequently possible to converse with a person, though to reach him would take a day's march—ultimately culminate in vast peaks crowned with perpetual snows. These "eternal snows" are mostly uncharted and unmeasured, and can only be compared with those of the Indian Himalayas. It is the writer's firm conviction that when this *terra incognita* is properly surveyed, peaks will be found rivaling in height even Mount Everest itself. The whole region may well be considered, both geographically and ethnologically, as a northern and eastern extension of the mighty Himalayan chain. For savage grandeur and wild, enchanting scenery it is comparable only with the Indian Alps.

This is a region where narrow bridle tracks, often excavated by blasting along the face of cliffs, do duty for highways. Nothing on wheels traverses this region, and, though mules and ponies are used sparingly here and there, the Chinese coolie is the pack-animal and beast of burden. These roadways always follow the courses of rivers and torrents and in the summer floods are constantly being destroyed. Landslides are of very common occurrence and add considerably to the danger and difficulty of travel. The writer has cause to remember these landslides. After being an eyewitness of many accidents, his turn came to be actually involved in one. He had a marvelous escape from death, but sustained a compound fracture of the right leg, which has rendered him lame for life.

The wild character of the country and absence of supplies render travel slow and exceedingly difficult. Yet the botanist and others must be thankful that the country is so savagely wild and impossible of cultivation, or the Chinese would have destroyed all the natural flora to make room for crops. Even as it is, the making of charcoal and potash salts is a severe tax upon forests, even in most remote and inaccessible regions. Wherever it is possible to get timber down to the streams the forests have been almost utterly depleted.

Through ignorance and lack of control China has bankrupted her forests, to the detriment of her climate and consequent fertility of her soil. The deplorable state of things, due to neglect and wanton waste of forests, obtaining in China should serve as a grave warning to other countries and particularly to our own.

### MILES AND MILES OF GORGEOUS RHODODENDRONS

In such wild mountain country, affording such variety in climate and blessed with a good rainfall, a rich and varied flora is to be expected. This, as indicated earlier in this article, is what is found, and the richness surpasses that of any other temperate region in the world. In the southern latitudes, near the seacoast and in the river valleys, a warm-temperate flora obtains. Above this, up to an altitude of 3,000 to 5,000 feet, according to latitude, we find rain forests, consisting largely of broad-leaved evergreen trees. Above this again, up to

Photo by E. H. Wilson, Arnold Arboretum

A TYPICAL LANE IN TARTAR CITY: CHENTU FU, 1,700 FEET

Photo by E. H. Wilson, Arnold Arboretum

CLUMP OF GIANT BAMBOOS (*Bambusa vulgaris* Schrad.), 60 FEET HIGH: BANKS OF MIN RIVER, NEAR SUI FU

Photo by E. H. Wilson, Arnold Arboretum

FIELDS OF WHITE OPIUM POPPY (*Papaver sómniferum* Linn.): CULTIVATED BANKS OF THE YANG-TSE RIVER, FENGTU HSIEN, WESTERN SZECHUAN

The Chinese have been rigorously enforcing the program enacted by the last international opium conference, which required that the area of opium poppies cultivated in China should be reduced each year

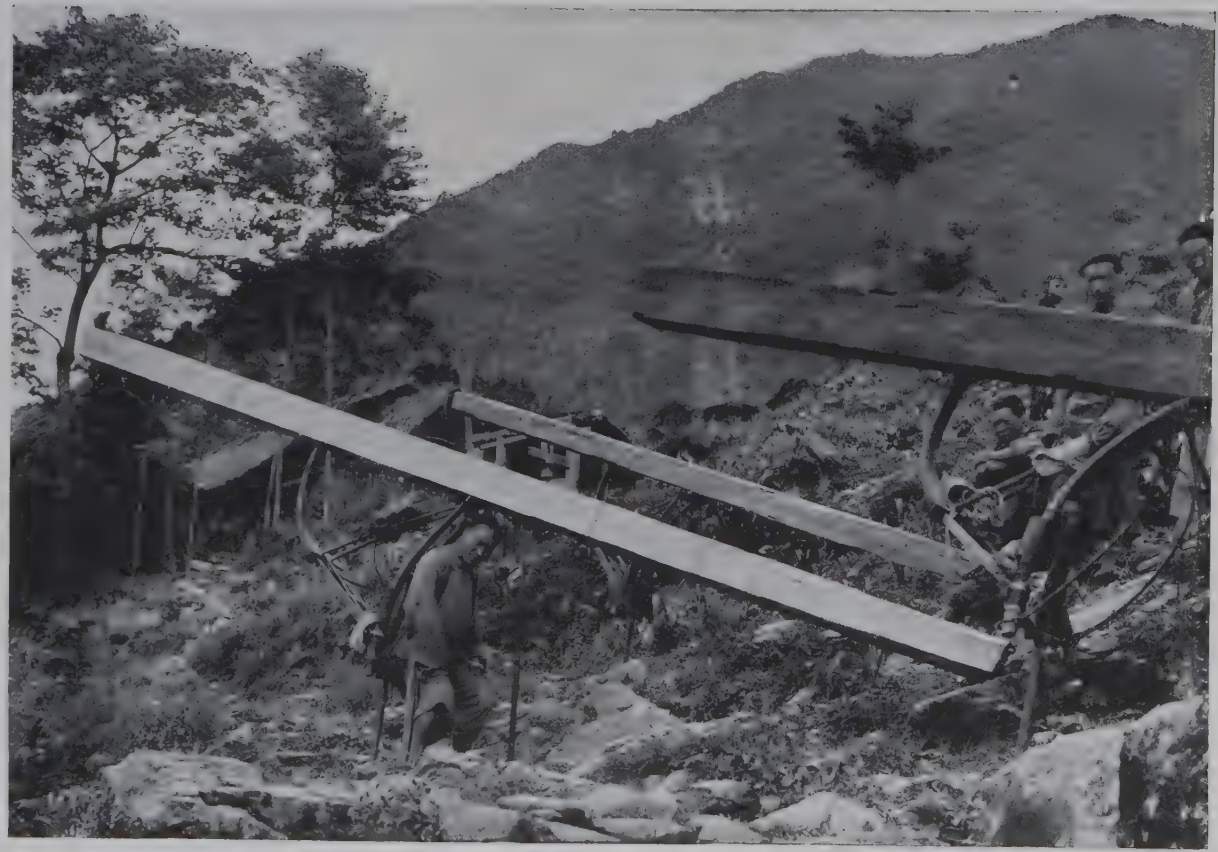

Photo by E. H. Wilson, Arnold Arboretum

A LOG OF *Tsuga yunnanensis* Mast. (A SPECIES OF HEMLOCK), 18 FEET 6 INCHES LONG BY 9 INCHES BY 7 INCHES THICK, CARRIED BY ONE MAN OVER MOUNTAINS

8,000 to 9,000 feet, the forests are composed of ordinary deciduous trees, similar in a general way to those of our own Atlantic seaboard. From 9,000 to 12,000 feet (the general limit of trees) are to be found magnificent forests of spruce, pine, silver fir, larch, and hemlock.

Throughout the conifer forests and extending downwards to 5,000 feet, rhododendrons frequently form the principal undergrowth. In June and early July no more gorgeous sight exists than the miles and miles of these rhododendrons in full flower. Rhododendrons are gregarious in habit and each species has its own well-defined altitudinal range. These characteristics give rise to belts of color—white, pink, scarlet, etc., as the case may be.

Above the tree-limit are undulating moorlands covered with coarse herbs, dwarf rhododendrons, willows, junipers, prickly oaks, etc. These give way to an Alpine vegetation, consisting largely of gentians, primulas, poppy-worts, louseworts, monkshoods, various composites, etc., all characterized by the intense coloring of their flowers. The limit of vegetation is reached at 16,000 to 16,500 feet. Above this are bare rocks, moraines, and glaciers, culminating in perpetual snows—the whole a panorama of wondrous beauty.

To the general reader it is difficult to convey any adequate idea of the nature of this beautiful flora. Technical names are meaningless to the majority, whose interest does not extend beyond an appreciation of the beautiful. It would be easy to fill a large volume with long names, but such a catalogue would serve no useful purpose here.

### OUR DEBT TO CHINA'S GARDENS

In the early part of this article our indebtedness in the past to Chinese gardens for so many plants familiar to all in these days has been lightly touched upon. It may be of general interest to know that China is the real home of, and not merely a place of ancient cultivation of, these and many other plants. In central China the wild parents of our tea and rambler roses, moutan pæonies, chrysanthemums, Boston ivy, Indian azaleas, gardenias, greenhouse and obconica primroses are common plants by the wayside cliffs or woodlands.

Also to China we owe the parents of our oranges, lemons, grapefruit, citrons, peaches, apricots, European walnut, and other valued fruits. These and other fruits are abundantly cultivated by the Chinese, and have been from time immemorial. The origin of our cultivated fruits, vegetables, and cereals is a fascinating though extremely difficult subject. That we owe much to the older nations of the world is beyond dispute, and amongst these China holds a prominent place. That we have not exhausted China's possibilities in this matter I hope to show later.

The Chinese flora is largely peculiar to the country itself, and, indeed, the number of endemic genera and species is remarkable, even when the size of the country is duly considered.

In the south and southwest there is a distinct Malay-Indian element, and in the north several European forms exist; in the far west there is found a distinct affinity with the Sikkim-Himalayan flora. Yet the real affinity of the Chinese flora is with the Atlantic side of the United States!

This remarkable fact was first demonstrated by the late Dr. Asa Gray when investigating the early collections made in Japan. Modern work in China, and especially central China, has given overwhelming evidence and established beyond question Asa Gray's theory. There are many instances in which only two species of a genus are known—one in the eastern United States and the other in China and Japan. Noteworthy examples are the Tulip tree, Kentucky coffee tree, and the Sassafras. In each of these China possesses one species and we have another. A considerable number of families are common to both countries, and in most instances China is the dominant partner. Usually we have one and China several species of the same genus, but here and there the opposite obtains. In a

Photo by E. H. Wilson, Arnold Arboretum

*Phyllostachys mitis* Riv., 20 TO 25 FEET HIGH, IN BUD: NEAR KIATING FU, WESTERN SZECHUAN

The shoots of this bamboo are more highly prized by Chinese and by many Europeans than asparagus shoots

Photo by E. H. Wilson, Arnold Arboretum

*Aleurites fordii* Hemsl., 10 FEET HIGH: BANKS OF YANG-TSE RIVER, WESTERN SZECHUAN

Flowers nearly white. Much cultivated for oil used for varnishing, which is expressed from seed. The oil expressed from the nuts of this tree is known as tung oil, or wood oil. It is the fastest drying oil known to paint manufacturers, and is imported by the thousand gallons from Hankau. The Department of Agriculture is experimenting with its culture, as the tree grows and bears well in the Southern States (see page 1027).

Photo by E. H. Wilson, Arnold Arboretum

A VARNISH TREE (*Rhus vernicifera* Dc.), 40 FEET BY 6 FEET: CHING CHI HSIEN, 4,500 FEET

The struts are to enable men to incise the trunk and collect the sap without their feet coming in contact with the acrid, poisonous sap. The remarkable lacquer of China is made from this sap. It is the most indestructible varnish known (see pages 1027–8).

Photo by E. H. Wilson, Arnold Arboretum

"PAI LU," A MEMORIAL ARCH TO THE MEMORY OF A VIRTUOUS WIDOW: A COMMON WAYSIDE FEATURE IN WESTERN CHINA, NEAR KIUNG-CHOU

few instances the same species is common to both countries. The most extraordinary instance of this is *Diphylleia cymosa* (umbrella leaf). This plant occurs in localities separated by 140 degrees of longitude and shows absolutely no marked variation.

In the instances mentioned above, the families are absent from any other region in the world. In others—for example, oak, hornbeam, elm, birch, ash, etc.—where the families range around the whole temperate zone of both old and new worlds, the individual species from China are usually more closely akin to those of North America than to Europe.

The explanation is to be found in the glaciation of the northern hemispheres in prehistoric times. In those far-off times the land connection between Asia and North America was much more complete than it is today, and the flora extended much farther to the north. The ice-cap which gradually crept down forced the flora to recede towards the equator. Later, when the period of great cold was over and the ice-cap receded, the plants crept back; but the ice-cap remained at a more southern latitude than before, and consequently rendered much of the land formerly covered with forests much too cold to support vegetable life of any sort. This rearrangement after the ice age caused a break between the two hemispheres and consequent isolation and cutting off of the floras. Other agencies and factors played a part, but the above explains briefly and roughly why the floras so much alike should, today, be so widely separated geographically.

### CHINA CAN STILL HELP US ENORMOUSLY

Since we live in a utilitarian age, in all work the question arises as to its practical use and value to mankind. This botanical exploration work in China has something more than a purely æsthetic and academic value. The beautifying of our homesteads and parks and the additions to our knowledge are not the beginning and end of this work so energetically pursued by the Arnold Arboretum. But as a scientific establishment, devoted to the study of woody plants, its work, after classifying, naming, cultivating, and demonstrating the hardiness and value of new introductions, ends. It is for others to take up the commercial side of these plants and their economic products. To the nurseryman and plant breeder the potential value of these new introductions may mean millions of dollars in the near future. The possibilities are incalculable.

Our Department of Agriculture at Washington is alive to the possibilities of China as a source of new economic plant products, and has already had an explorer in the northwest of the Empire.

In no other country do economic vegetable products enter so largely into export trade as in China. Take, for example, oil-bearing plants. There are a dozen or more largely cultivated in China, but the demand exceeds the supply. In the matter of drying oil for paint and varnish works, Chinese wood oil is superior to linseed oil. This oil, obtained by crushing the seeds of two kinds of small trees, known as *Aleurites Fordii* and *A. cordata*, is annually exported in increasing quantities. The former species supplies by far the major proportion of wood oil exported. It is abundant in the rocky regions around Ichang and throughout the Yang-tse gorges, thriving on the poorest of soil, where a minimum rainfall of 30 inches falls, withstands drought and a few degrees of frost. When in flower, which occurs before the leaves unfold, it is very handsome, and it never fails to produce a large crop of its green apple-like fruits. There must be parts of this vast country of ours where the wood-oil tree would thrive, and some day it will probably become a great industry with us (see page 1024).

Every one is familiar with the lacquer work of China and Japan. The tree (*Rhus vernicifera*) that produces this

Photo by E. H. Wilson, Arnold Arboretum

MEN LADEN WITH "BRICK TEA" FOR THIBET

One man's load weighs 317 pounds avoirdupois, the other's 298 pounds avoirdupois. Men carry this tea for hundreds of miles, accomplishing about 6 miles per day, over vile roads (see pages 1029 and 1035).

Photo by E. H. Wilson, Arnold Arboretum

MAIN ROAD FROM CHINA TO LHASSA (CAPITAL OF THIBET), HEREABOUTS BLASTED OUT OF HARD ROCKS: VALLEY OF THE TUNG RIVER, 4,000 FEET

Several men laden with "brick tea" appear in the left foreground

lacquer is perfectly hardy and grows freely in the Arnold Arboretum. Why should not the United States of America grow lacquer and develop the industry on modern lines? (see page 1025).

Another species of Rhus (*R. succedanea*) produces a fatty tallow-like substance from its seeds, which is largely used for candle-making in Japan. The seeds of *R. vernicifera*, too, contain an oil which when expressed is used in China as an illuminant and for candle-making. The gall nuts, from *Rhus semialata*, furnish the finest material in the world for tanning purposes. The only hardy rubber tree known is a Chinese tree called *Eucommia ulmoides*. The leaves and bark of this tree are full of a substance akin to caoutchouc. This rubber, though it needs to be separated mechanically and is of low-grade quality, yet from the ease with which the tree can be grown, even in northern Massachusetts, might prove a paying venture. Rubber is a substance to conjure with even in these days, and the future will demand more and more. Synthetic rubber will never be a commercial product, and every living tree yielding rubber should be carefully experimented with. Para rubber will always lead, but this tree requires equatorial regions and conditions, and the area suited to its culture is limited and circumscribed.

Experts from time to time warn the world of an approaching timber famine. Nearly every civilized nation is doing something in the matter of preserving its natural woods and forests and extending them by careful planting and reafforestation. Both hard and soft woods are in increasing demand, and the world's timber bill annually increases enormously.

In addition to many other fine timber trees, there exists throughout the Chino-Thibetan borderland many kinds of valuable pine and spruce trees. Indeed, more species of spruce are to be found in this region than in the rest of the world put together. The majority of these are now in cultivation at the Arnold Arboretum, and their hardiness and suitability to the climate will be thoroughly tested. If they win out, who can appraise their possible value for afforestation purposes in this country? When we realize what a valuable tree the Japanese larch is in Scotland, where it is much more resistant to the canker than European larch, it behooves us to take good stock of these new spruce from China. We cannot have too many valuable timber-producing trees.

Turpentine gets more expensive every year, and the supply falls short of the demand; perhaps one of these new Chinese pines may be useful as an additional source of supply.

Constant efforts are being made to improve and increase our supply of berry-producing plants. In China over 100 species of Rubi are known to exist, and many of these are now in this country. Among these brambles and raspberries are several which, even in a wild state, produce first-class fruits of good flavor. By cultivation they may be much improved, and by cross-breeding may yield berries far in advance of the best today.

In the regions we write of a black currant is found, with berries of good size and flavor borne on racemes a foot and a half long! If it can be crossed with the finer cultivated forms a new race of currants yielding fruits after the manner of grapes may arise. Two or three gooseberries are wild in the woods of China; maybe they will resist the dreaded gooseberry mildew and enable us to cultivate this desirable fruit. The Arnold Arboretum has these berries and many other plants. Who will prove their economic value?

### CHINA IS THE ORIGINAL HOME OF THE TEA PLANT

Our work is with woody plants only, but one has merely to mention the soya-bean and its recent development to prove that the world is only just beginning to appreciate China as a source of economic plants and plant products.

All the world knows that China is the original home of the tea-plant industry.

Photo by E. H. Wilson, Arnold Arboretum

TACHIEN LU FROM THE SOUTH: 8,400 FEET

The town was destroyed 100 years ago by a landslip

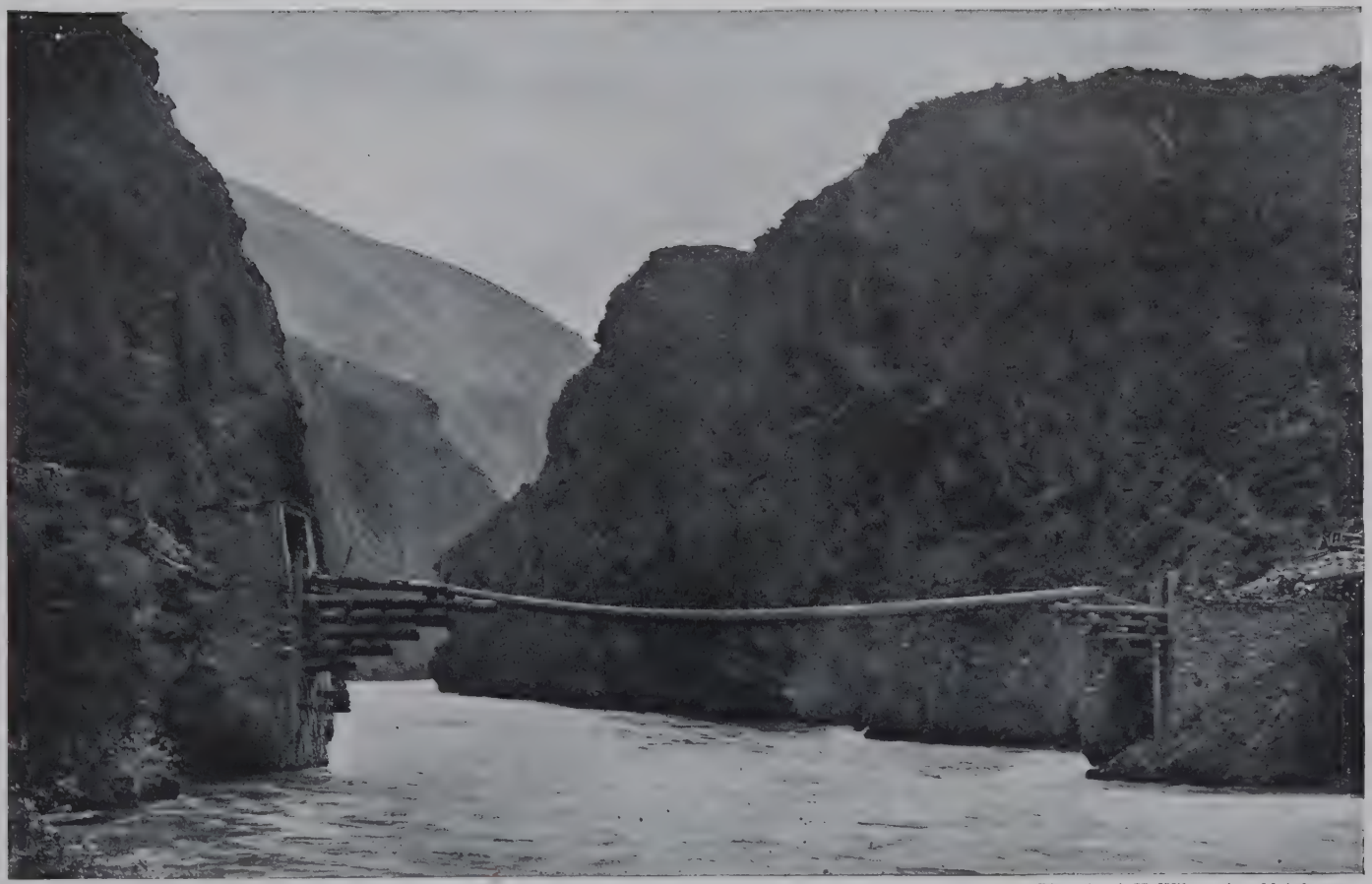

Photo by E. H. Wilson, Arnold Arboretum

BRIDGE OF TWO LOGS, EACH 40 YARDS LONG, ACROSS WHICH THE MAIN ROAD FROM CHINA TO THIBET PASSES: MONKONG TING

Photo by E. H. Wilson, Arnold Arboretum

A FAVORITE CHINESE VEGETABLE, WHICH IN APPEARANCE SOMEWHAT RESEMBLES THE PUMPKIN

The rind exudes a white wax, clearly seen in the picture, which protects the fruit from insects and decay. The technical name is *Benincasa cerifera* Savi. The market gardens at Chentu

Photo by E. H. Wilson, Arnold Arboretum

A MANTZU CAVE CUT OUT OF A ROCK CLIFF BY A RACE NOW EXTINCT: NOTE THE ORNATE CARVING AROUND THE ENTRANCE: BANKS OF THE MIN RIVER, NEAR SUI FU

Some 60 years ago the industry was introduced on business lines into India and Ceylon, with the result that today these countries supply a greater portion of the world's demand than does China herself. Antiquated methods of cultivation and preparation, absence of co-operation amongst the growers, and heavier taxation are responsible for this decline. It is true that Chinese tea is in quality and delicacy of flavor far ahead of Indian and Ceylon teas, but tea-drinkers generally have acquired a taste for the rougher, dark-colored teas, and China's conservative methods are killing what was once her greatest export industry. Though tea as a beverage is universally drank throughout the length and breadth of the Empire, it is by no means all infused from the leaves of the genuine tea-plant.

In the mountainous parts of central China the peasants hardly ever taste real tea, the leaves of various crab-apples, spiræas, and willow being commonly employed. The writer has drank so-called tea infused from the leaves of a great variety of plants, but bed-rock was reached when chips of wood of a willow tree were on one occasion used. The "infused tea" was decidedly weak and nasty."

To the Thibetans and kindred tribesfolk tea is a necessity of life, and with most of their trade with China this commodity is taken in barter for their wool, skins, gold dust, medicine, etc., and the Chinese carry on an extensive and profitable trade with these people. The tea supplied by China to Thibetans is all grown in western China, and is of the roughest and poorest quality. It is prepared in two distinct ways. For northwestern Tibet and regions around the Koko-nor the plants are stripped of their leaves and the twigs are frequently chopped up and pressed with the leaves into large bales, oval or rectangular in shape, each weighing 90 or 180 pounds.

For the rest of Thibet the leaves are roughly sorted and graded, then steamed, pressed into molds the size and shape of a large brick. These are then wrapped in paper, stamped, and packed in long cylinders made of split bamboo.

This brick tea for Thibet must not be confused with the brick tea made in the foreign factories in Hankow chiefly for the Russian market. The latter is in every way a vastly superior article.

# TRIPOLI: A LAND OF LITTLE PROMISE

By Adolf L. Vischer

TILL the beginning of the Turco-Italian war, Tripoli of Barbary was practically unknown to the average man. In fact, apart from the coast, the Turkish vilayet Tarabulus-el-Gharb ranges among the least explored countries of the Dark Continent. The few visitors to Tripoli whom chance had brought to that part of the African shore were all invariably struck by the great charm which lay over it. There at last the lover of the East could find a land unspoiled by railways, manufactories, smoke. There was still an African reservation, and the warden of that reservation was the Turk.

This, however, is now a thing of the past. It is advisable, therefore, that there should be put on record some impressions of the people of Tripoli and of the resources and possibilities of the country, basing the following account on the personal experience that we had the opportunity to gain during a stay in Tripoli last year.

Tripoli is not a geographical unity, but a collection of different countries, which were held together by a common bond—the Turkish rule. Tripolitania, or Tripoli proper, and Fezzan formed together the province or vilayet Tarabulus-el-Gharb, ruled by a governor-general,

Photo from "The Gateway to the Sahara," by Chas. Wellington Furlong: Scribner's

MARKET OUTSIDE TRIPOLI'S WALLS: CASTLE AND CEMETERY ON THE RIGHT

whose seat is Tripoli town. Cyrenaica was a subprovince with an administration directly responsible to Constantinople.

Let us briefly summarize the geographical features of the country.

Tripolitania occupies the land along the Mediterranean Sea from the Tunisian frontier to the Gulf of Sidra. From the coast southward, with an average width of 40 miles, runs a plain called Jefara. At its southern border rises with a steep ascent a chain of mountains commonly called the Jebel, of which the most famous part is Jebel Gharian. These mountains form a sort of tableland, which slopes slightly southward till it reaches the Hamada-el-Homra, a flat, rocky plateau of about 40,000 square miles, covered with little red stones, absolutely dry and arid. In the south of the Hamada is the land of Fezzan, a collection of oases in a country of dunes and desert. Fezzan forms a wedge of sparsely inhabited land into the great Sahara.

### THE HARBORS ARE POOR

Cyrenaica is a projection into the Mediterranean between the gulfs of Sidra and Solum. A section through its center from north to south shows a small plain along the coast; then a steep ascent, which leads to a plateau. This is bounded southward by a second ascent. Behind this a great plain opens, running southward to the Libyan Desert.

It may be added that the frontiers of Tripoli have never been definitely defined, except the part from the seashore to Ghadames, which was settled in 1910 by a Turco-French boundary commission. The undefined frontiers of Fezzan gave rise to many a dispute between the French and the Turks, especially since the Turkish officials of Fezzan developed, in the last few years, a certain activity.

The coast of Tripoli, which extends over a length of 1,100 miles, offers but few natural harbors. The harbor of Tripoli itself is dangerous, because of the many rocks which lie at the entrance, and it was no rare occurrence that in rough weather the steamer could not approach the port. But the harbor is capable of improvement. The ports of Benghazi and Derna are in the same condition.

It is only on the eastern coast of Cyrenaica, which is sometimes called the Marmarica, that we find two harbors of the very best quality: Bomba and Tobruk; but, as both have no hinterland, their value is more strategical than commercial. Tobruk, especially, is highly praised by all visitors, and the German explorer Schweinfurth places it, as regards security, on the same level as the famous French port of Bizerta, in Tunis. Tobruk is less than a hundred miles distant from the Egyptian frontier, and it is not unlikely that it will play in the future an important rôle in Mediterranean politics.

### THE INHABITANTS

What is the population now inhabiting Tripolitania, that immense area of 400,000 square miles? No exact census exists, but all competent observers agree that it hardly exceeds 800,000. That means about two inhabitants to the square mile. The sessile or settled population inhabits an area of about 19,000 square miles; that means, roughly, the twenty-first part of the whole land.

A recent writer, Mr. Ewald Banse, estimates the number of the inhabitants of Tripoli proper (the Jefara plain and the Jebel region) as 350,000, of Fezzan as 40,000, and of Cyrenaica as 150,000. The population of the city of Tripoli consists of about 50,000 inhabitants. Of these, 10,000 are Jews, 35,000 Berbers and Arabs, and the rest consists of Maltese, Levantines, Italians, and other Europeans. The number of genuine Italians, excluding the Levantine and Jewish protégés of the Italian consulate, hardly exceeds 200.

The Italians and Maltese are petty traders, artisans, and fishermen. The Jews are traders and artisans and especially smiths, as in Mohammedan countries smithing is regarded as an ignoble profession. A fair number of Jews live

in the Jebel Gharian. This remote Jewish colony is of very old date. Very likely the immigration of Jews into Tripolitania took place under the Roman rule, about 300 A. D.

The Jews of Gharian live, like their Berber fellow-men, in underground houses, and their underground synagogue at the village of Tegrinna is one of the most interesting buildings in Tripolitania.

We do not need to describe these underground houses, as they differ but little from the underground houses in Tunis, so masterly described by Mr. F. E. Johnson in the September number of the NATIONAL GEOGRAPHIC MAGAZINE.

Some confusion prevails as to the difference between Arabs and Berbers. In Tripoli every native calls himself with pride an Arab. As a matter of fact, a certain number of Arabs came into the country with the Mohammedan conquest of North Africa in the sixth century A. D. But the peninsula of Arabia was never so densely populated that it could send away many emigrants. The Arabs conquered North Africa and converted its population to their religion. A few of the conquerors remained in the country, and these are still fairly pure representatives of their race; they live as nomads, or Bedouins, in tents, and move with the seasons from one camping ground to another. Their number is difficult to estimate, as we find them now in the steppes of the Syrt, now in Cyrenaica or Fezzan. Their numbers have, however, been well estimated at about 50,000. A few Arabs, however, have become sedentary and cultivate a little land around Benghazi.

The rest of the population of Tripoli, and that is the sessile part, are Berbers; their blood is mixed with that of Arabs, and also of negroes. The negro element, which we find everywhere in Tripoli, has its origin in the slave traffic of former days, which brought thousands of Sudanese to the coast of the Mediterranean.

In Cyrenaica we find the same kind of population—sessile Berbers and nomad Arabs—but Berbers and Arabs are in Cyrenaica more mixed.

Among the inhabitants of Fezzan are representatives of nearly all North African peoples. In the Wadi Shiati, south of the Hamada el-Homra, there are Arab tribes, while the inhabitants of Sokna and Bonjem are Berbers. Murzuk, that great intermediary station between the Mediterranean and Lake Chad, is a town of easy morals, and its population is a mixture of all the North African races.

### MURZUK, IN SOUTH TRIPOLI

Mr. Hanns Vischer, one of the few travelers—they are not more than three—who visited Murzuk in the last 20 years, gives us in his "Across the Sahara" a picture of the life in that town which we should like to quote:

"During the day all Murzuk can be seen in the high street, walking or riding along through the deep sand toward the market at the east end, to which the peasants bring their produce from the gardens to sell to the Turkish officials and the soldiers of the garrison. An occasional trader, too, from Bornu or the Sudan may sell some of his goods before going on toward the coast. Sometimes Tuaregs and Tubbus bring their dates here or put up a camel for sale; and, side by side with sugar, scented wood, and tea, are to be found the glittering gewgaws from Tunis and Tripoli. Glasses, beads, scents, and colored silks, cheap productions of European markets, are there, which give the whole scene a merry coloring and please the Murzuk people, reminding them a little of former days, when the immense caravans from Bornu camped round the town and Tripoli and Benghazi sent thousands of camels through the town each year. . . .

"Around the grass shelters under which the wares were laid out, there was as much life and animation as in any of the great African markets. Hausas, Kanuris, Bagirmis, and Fellata slaves jostled sulky Tubbus; old Murzuk traders who has seen better days passed up and down, full of importance, as if the

Photo from "The Gateway to the Sahara," by Chas. Wellington Furlong: Scribner's

"IN THE HEART OF TRIPOLI STANDS . . . THE ARCH OF MARCUS AURELIUS"

"Evidences of the Roman occupation confront one on every hand. Columns of a Pagan Rome support the beautiful domed vaultings of some of the mosques, or are set in as corner posts to the houses at every other turn, and the drums thrown lengthwise and chiselled flat are used as steps or door-sills. Beyond the walls of the town fragments of tessellated pavement laid down two thousand years ago are occasionally found. Two Roman tombs decorated with mural paintings were recently discovered about a mile or so from the city. In the very heart of Tripoli stands what once must have been one of the most splendid triumphal arches of antiquity. It is known to the Moors as the Old Arch; to the Europeans as the Arch of Marcus Aurelius, in whose honor it was erected A. D. 164."

Photo from "The Gateway to the Sahara," by Chas. Wellington Furlong: Scribner's

THE END OF THE GREAT CARAVAN ROUTE FROM THE SUDAN AS IT ENTERS TRIPOLI

traffic depended on them; Arabs from the coast poked their long guns into every one's face as the crowd nervously made way for them. Tuaregs, Turks, Albanians, splendidly grown Turkish soldiers in torn uniforms, all acted their part with the greatest entrain."

At Gatrun, south of Murzuk, the inhabitants show all the characteristics of the Bornu people. As a matter of fact, the Bornu rulers of the Sefiya dynasty in the XIIIth century A. D. included Fezzan in their empire. They founded in that country slave colonies for the working of the Natron mines and for the protection of the caravan trade. The capital of the Bornu empire was Kuka, on Lake Chad. The actual Shehu of Bornu is still the owner of a certain number of date palms in the oasis of Murzuk.

In Tejerri, the most southern inhabited place of Fezzan, we find Tubbu Reshade, representatives of that lawless desert tribe which has its headquarters in the rocky highland of Tibesti. The old castle of Tejerri, which is perhaps of Roman origin, serves to the inhabitants as a refuge in times of invasion by desert brigands.

### UNDER THE PROPHET'S GREEN BANNER

Besides these more or less distinct races, there are the dark and not especially characterized Fezzanis. They are probably but a bare 40,000 in number. In about eight inhabited places they fight a hard struggle against the dunes which threaten to invade the few cultivated lands. The products are hardly sufficient to maintain the frugal inhabitants, and this compels many of them to go to the coast towns, to Tripoli and Tunis, and earn a livelihood there as servants or artisans. These have a touching affection for their country, and after some years they return home with the money earned. Cattle-rearing is of small importance in Fezzan. The land has no large pasture grounds, and the Fezzani drives his cattle and sheep to pasture on the steppes of the Syrt.

All these different peoples are united under the green banner of the Prophet, who in our days has his most fervent followers in North Africa. The religious brotherhood of the Senussiya has branches in nearly every town and village. Its meeting-places, or Sawyas, are convent, mosque, school, and hospital in one. The teaching is puritanism and uncomprising hatred of everything that is foreign and infidel.

That, however, does not mean that every follower of the Senussiya is a dangerous enemy of the European; he merely avoids all intercourse with him. Some Europeans have even experienced kindness and hospitality from fervent Senussis. That, of course, was only possible provided they did not offend the Islamic creed or violate Eastern customs. Turks themselves failed repeatedly to get into contact with the leaders of the sect; but a change came not long ago when a political understanding between the Senussis and Stambul became so far a fact that a Senussi mission was dispatched to the Sultan.

The headquarters of the sect are in the Libyan desert, probably in the oasis of Kufra. There is the Sawya-el-Istat, or convent of purity. The headquarters were first at Benghazi, but later, it was said after representations from the European consuls, they were removed further inland. The sect is very strong in Cyrenaica and Fezzan. One of the tenets of Senussism has had some slight effect on commerce, viz., that of tea-drinking. The old sheik of the Senussi, seeing the gradual spreading of alcohol among the North African Mohammedans, advocated the substitution of tea, and since then the drinking of very strong tea, to which a large quantity of sugar has been added, has become quite a mania, which cannot fail to damage the nervous system of the people.

The chief industries of Tripoli town are leather and metal work; also the esparto-grass business and sponge fishing. Sponge fishing is of considerable importance, but it is almost entirely done by Greeks, who appear once a year with a flotilla in Tripolitan waters, and therefore this industry affects the country

but little. In different places along the coast a certain number of salt pans are exploited by the Turkish government. In Misurata, a town some 100 miles eastward from Tripoli, fine carpets are manufactured, which are sold in the bazaars of the capital.

The home industries of Tripoli were greatly encouraged by the Turkish Technical School which was founded by the late Marshal Redjeb Pasha, who acted for 10 years as governor-general of the vilayet. He was a man of remarkable ability, an excellent administrator, who did more for the welfare of the country than any of his predecessors. In the first Young Turkish administration of 1908 he was appointed Minister of War. He returned to Constantinople, from which he had been so long sundered by the Hamidian policy of keeping the strongest men in the remotest posts. But his new appointment was of short duration, for he died a few weeks after his arrival in Stambul. In an obituary notice the *Times* described him as "one of the ablest men in the Turkish Empire." He had governed Tripoli honorably for many years, and it was said that he left in debt.

On this occasion it may be permissible to mention some other distinguished Turkish officials who struggled for the progress of that forlorn province of the Ottoman Empire under most difficult circumstances, and whose names ought to be remembered by the outside world. Djamy Bey, deputy of Fezzan in the Turkish Parliament, was a man of high education, through whose energetic measures the communications between the coast and the hinterland were greatly improved. By his remarkable description of the Tuareg city of Ghat in the *Geographical Journal* (London, August, 1909) he made himself known in the geographical world. Samy Bey, governor of Fezzan, was a man whose whole life was devoted to the betterment of that poor province. By his able policy he brought the lawless desert tribes under Turkish rule. Under the régime of Abdul Hamid he suffered for the Young Turkish cause as an exile in some remote part of the Empire for 10 years. Mention should also be made of Dr. Reshid Bey, who ruled the province of Homs for the last four years; he also ranges among the class of high-minded and noble men. Certainly not all Turkish officials in Tripolitania have deserved praise, but the names of these men who worked for their country in a spirit of noble and unselfish patriotism ought not to be forgotten.

### BARLEY AND ESPARTO GRASS ARE THE PRINCIPAL PRODUCTS

Agriculture and cattle-rearing are the chief resources of Tripoli, but they flourish only in small patches; fertile land we find on a narrow strip along the coast, in the region of Jebel Gharian and in Cyrenaica. The product is barley, which in the last few years has superseded wheat, olives, figs, and vines. Barley is shipped from Cyrenaica, mainly to England, but the crops are subject to great variations. Four years ago barley had to be imported into Benghazi, owing to the complete absence of rain, which caused a failure of the crop in western Cyrenaica. The same is now being experienced in Tripoli, where a famine threatens the population, as there has been scarcity of rain for the last two years.

Some figures may illustrate the amount and also the variation of the barley export: In the year 1903 it amounted to £70,000; in 1904 it was only half that of the previous year, £32,000, and in 1908 the export was practically nil.

Another important product of the soil is esparto grass. Esparto, or Spanish, grass (*Lygeum spartum*) is a grass resembling the ornamental feather grass of gardens. It attains a height of three or four feet. On account of the tenacity of its leaves it has for centuries been employed for the making of ropes, sandals, caskets, and mats. It grows in the steppes and in the Jebel, as in Morocco and Algiers, but is inferior in quality to that of these countries. It is mainly shipped to England, where it is now used

Photo from "The Gateway to the Sahara," by Chas. Wellington Furlong: Scribner's

A BAREFOOTED BAKER MOULDING COARSE DOUGH INTO ROUNDED LOAVES

in the manufacture of paper. It is brought to Tripoli or to Homs (a town on the coast eastward of the capital) by the Bedouins. In these places, which are the centers of this trade, European firms have erected machinery, where the grass is pressed in packs. The esparto-grass export amounted in 1903 to £76,000; in 1904, £126,000.

The dates of Tripolitania are not of a very good quality and they are not in any appreciable quantity exported. Date palms grow along the coast and in Fezzan. At the end of the summer Bedouins of the Jefara go to Fezzan for the crop of dates and take to the Fezzanis in exchange barley and wheat.

More important than agriculture is the cattle-rearing. It flourishes in Cyrenaica, from where cattle, sheep, and goats are exported by ship to Malta and overland to Egypt. There is also a considerable export of camels to Egypt and Syria. The imports to Tripoli consist chiefly of foodstuffs, tea, cotton goods, and sugar.

### THE REASONS OF TRIPOLI'S DECLINE

Much has been said in the press and by Italian political writers about the grandiose prospects of the country. These prospects are mainly based upon the supposition that Tripolitania was, under the Roman empire, a province of flourishing agriculture and enormous wealth. There can be no doubt that Tripoli once saw better days, although the accounts of some of the ancient writers seem to be exaggerated. The causes of the decline are manifold and far from clear. The decline commenced

Photo from "The Gateway to the Sahara," by Chas. Wellington Furlong: Scribner's

SUDANESE BLACKS ANNOUNCING A RELIGIOUS DANCE

when Rome's power began to weaken. The wild tribes of the desert, which had been kept down by force, took advantage of Rome's weakness and attacked the boundaries of the colony. The elaborate system of irrigation could only work when there was absolute security. When peace was no longer assured, the agriculturist was hindered in his work.

A second cause of the decline of the country—which is, however, still a point of controversy—is a change in the climatic conditions of the region. There is probably some truth in this assertion. Every man who has seen, in the midst of the desert, the ruins of Roman castles and villas comes to the belief that some mightier power is responsible for such a change.

A great tragedy has been enacted here. Mr. Hanns Vischer gives us a description of what he saw in Gherria, the ruin of a Roman town on the road between Tripoli and Fezzan. "It was a pitiful sight to behold a hungry-looking crowd of fanatics under the ruins of the Roman gateway bearing the inscription, 'Pro. Afr. Ill.' (Provincia Africa Illustris)."

Mr. Pervinquière, the French geologist, who traveled from Tripoli to Ghadames in the spring of this year, says of the country which he traversed: "It is difficult to form an idea of the desolation of the immense solitudes. For days and days we advanced over naked rock. No trace of vegetation. Everything is cleared away by the wind, which rules over these plateaus. . . . The reason for such a sterility has not to be sought in the geological constitution, but in the

atmospheric conditions. It never rains in that land. A local tradition says that the bad behavior of the women of the country prevents the clouds from giving rain. I should not like to give an audacious judgment on the virtue of these ladies, but I must mention that often five, seven, and ten years pass without rain."

Apart from the scarcity of rain, we find in the invading sand dunes another great enemy of agriculture. A great space of the Jefara plain is covered with them, and in their migration they threaten to invade the cultivated patches. Quite near to the palm gardens around the city of Tripoli one can see dunes rising to a height of about 70 feet.

### HER FORMER PROSPERITY GREATLY EXAGGERATED

The only scientific investigation of the resources of the soil we owe to a commission sent out to Cyrenaica by the Jewish Territorial Organization to examine the territory proposed for the purpose of a Jewish settlement. Prof. J. W. Gregory, the head of that expedition, came to the conclusion that the general reports of the former wealth, dense population, and exceptional fertility of Cyrenaica have been exaggerated. Although the soil is excellent, it is patchy, and the country is better suited for pastoral than for agricultural occupation. Owing to the scarcity of water, the country could never have supported, and never will support, a dense population. Storage of water presents difficulties, owing to the porosity of the soil.

What Professor Gregory says about Cyrenaica may be true, with some modifications, also, for Tripoli, which never was examined scientifically from that point of view. If it may be permitted to utter a personal opinion here, one would say that the lot of the inhabitants could be improved by bettering the means of communication, and thus enable them to sell more easily the products of their land; by construction of artesian wells and of irrigation works, and by encouraging the home industries by foundation of technical schools, as already started by the Turkish government. But such measures would require comparatively large capital. It is more than doubtful if the land can become the home of a great number of European settlers.

The somewhat sanguine prospects of mineral treasures in the soil are based on no solid grounds. Professor Gregory is absolutely pessimistic about Cyrenaica; the few investigations made in Triopli by some geologists are not encouraging. Mr. Pervinquière, on his journey to Ghadames, found that the deposits of Zar, which some one had described as nitrates, were merely gypsum. Equally unsatisfactory was the examination of samples of phosphates found in the Jebel.

Some 50 years ago Tripoli deserved, with a certain right, the grandiose names of "the Key to Central Africa," or "the Queen of the Sahara." Today these glories are of the past. Once Tripoli was the great emporium of the trans-Saharan trade. Not far from Europe, and by its situation in the Syrt nearer to the heart of Africa, it was the gateway of the trade with Central Africa. Large caravans arrived laden with the goods of the Sudan and the Niger countries. These goods were ostrich feathers, ivory, skins, minerals, and slaves. The slave traffic was the most remunerative article of that trade. In exchange the caravans took south the productions of the European market. Murzuk and Ghadames were then the important intermediary stations, and the trade brought wealth and life to these remote towns.

The decline of the trans-Saharan trade began when the representatives of the European powers protested against slave trade. After these remonstrances the Turks began to stop the slave traffic. Nowadays the slave traffic on the routes between Tripoli and the south can be regarded as extinct. It is said that there is still some slave traffic going on on the Benghazi-Wadai route, but such assertions are difficult to prove, as this traffic is carried on secretly.

Another cause of decline was this:

Photo from "The Gateway to the Sahara," by Chas. Wellington Furlong: Scribner's

A RAIDING BAND OF TUAREG SERFS

"In their veins flows the blood of Berber ancestry, and in their language is preserved the purest speech of that tongue. The ancestors of these tribes were likely the most liberty-loving of that independent race, and probably, rather than be subjugated, they retreated into the vast spaces of the Great Desert. Here, at certain centers, they have towns built under the shade of the towering date-palms of the oases; but most of their life, often without food and shelter, is spent on the march."

that the French, who had established themselves in Algiers and Tunis, tried to deviate the caravan trade to these countries and thus make it avoid Tripoli.

Further, through the advent of European administration in Tunis, Algiers, and Egypt, all lawless elements of these countries retired to the eastern and middle Sahara, where they molested the passing caravans, thus making the route very unsafe.

But more important than all these causes just mentioned was the advent of European control in the Niger countries and Hausaland. Shipping was started on the great rivers Niger and Binue, and the communications with the west coast of Africa were greatly improved. The inauguration of the railway from Lagos to Kano, the greatest market in the western Sudan, is the end of these efforts. The goods of the Niger countries are now sent by ship or by rail to Dakar or to Lagos, from whence they reach Europe in a relatively short time. This new route is safer, cheaper, quicker than that of nearly 2,000 miles across the Sahara, where water is scarce and robbers abundant. The only route where the trade is still of some importance is that from Benghazi to Wadai, although it is a very difficult one. But it is more than probable that with the occupation of Wadai by the French the

OUTLINE MAP OF TRIPOLI AND HER NEIGHBORS

trade of this country will also be diverted to the west coast. With the gradual decline of this trade the lot of the inhabitants of Murzuk and Ghadames, who lived by this trade, became worse and worse. They cannot turn to agriculture, as these towns are surrounded by desert. "Ghadames is in a state of complete decay," says Mr. Pervinquière.

The trans-Sahara trade is practically dead. But the Sahara is, and for many years will still be, crossed by pious Moslems from the western Sudan who will perform their pilgrimage to the holy city of Mecca. Through these pilgrims an intellectual or spiritual communication will still exist between Tripoli and the heart of Africa.

# THE GREAT RAINBOW NATURAL BRIDGE OF SOUTHERN UTAH*

By Joseph E. Pogue, United States National Museum

*With Photographs by the Author*

NEAR the southeast corner of Utah, in a remote and well-nigh inaccessible part of the Navaho reservation now given over to the use of the Piutes, is situated a natural bridge, called by the Navahoes *Nonnezoshe,* the stone arch, by the Piutes *Barohoini,* the rainbow, which surpasses any structure of its kind known to man. Even the other great bridges of southern Utah, the Caroline, the Augusta, and the Edwin, known since 1902, are exceeded in size and beauty by the rainbow arch. Discovered but little over a year ago, it has thus far been visited by less than 25 white men and described but once.†

Recently a United States Geological Survey party, consisting of H. E. Gregory, in charge; John Wetherill, K. C. Heald, and the writer, stood upon the summit of Navaho Mountain and looked over a country of wildness and grandeur. Fifty miles to the north the graceful peaks of the Henry Mountains outlined themselves against the horizon; much nearer, the Colorado and San Juan rivers united in the midst of a tilted and disjointed table-land; to the west, the Colorado was already beginning to make that wonderful mile-deep gash so fitly called the Grand Canyon; while to the south was visible the even skyline formed by the extensive tops of Black and White mesas. Turn in whatever direction one would, the scene was one of bewildering magnitude.

Nearer at hand, surrounding the mountain like an island, surged a billowy sea of red sandstone, carved into fantastic, rounded, and oval masses, colossal in size, between whose cross-bedded and swirling slopes wound deep and tortuous canyons. Hidden away in such a labyrinth, it is not surprising that the bridge remained so long unknown. Yet it is only four miles distant in a northerly direction from the mountain's summit, and is visible from this point as a tiny arch, provided one knows exactly where to look. Otherwise the eye may wander at will over this wilderness of rock without sighting its most interesting feature.

Although so close at hand, this goal was only reached after two days' time and a journey of 35 miles over a very indirect route. The mountain had to be descended to the south, a long detour made around its eastern flank, and a devious and winding course followed northward down the bridge canyon, over a trail ever difficult and ofttimes dangerous. The way led between lofty and perpendicular cliffs, towering to a sheer height of one-fifth of a mile, on whose vertical sides could now and then be descried the crumbling ruins of some ancient cliff-dwelling.

In places the walls overhung to form vast semi-spherical chambers, large enough to shelter a cathedral, and in which a shout echoed and re-echoed many times; in other places the sides approached so closely that the only foothold was in the rocky bed of the small stream below, where one was forced to pick a precarious passage from boulder to boulder.

After hours of laborious and intricate travel, a point was rounded and 500 yards ahead a graceful arch was outlined, beneath which the canyon and stream continued their flexuous partnership. The first view of the bridge is minimized by the lofty walls beyond and

* Published by permission of the Director of the United States Geological Survey.

† Byron Cummings. The Great Natural Bridges of Utah. National Geographic Magazine, v. 21 (1910), pages 157–167.

Photo by Joseph E. Pogue

A VIEW OF THE GREAT RAINBOW (NONNEZOSHE) ARCH FROM UP-CANYON, SHOWING THE LOFTY CANYON WALLS AND THE CHARACTER OF THE FORMATION FROM WHICH IT IS CARVED

The arch is carved from a buff-colored, fine-grained sandstone, brick-red upon its surface and stained with vertical streaks of a darker shade. Mostly massive, though in part oblique-bedded, the rock is only moderately firm, and is easily crushed beneath the blows of a hammer.

the comparatively narrow defile, through which it is only partly visible; but once passed under, it may be seen in its magnificence and entirety.

A towering arch, rainbow-shaped, of wonderful symmetry, rises nearly sheer from a ledge on the one side, and, spanning the stream, joins the opposite can-

Photo by Joseph E. Pogue

A CLOSE VIEW OF THE GREAT RAINBOW ARCH FROM UP-CANYON

"The arch is supposed by the Indians to represent the rainbow, or sun path, and one who passed under could not return without a certain prayer. Evidently Whitehorsebegay had forgotten this prayer and feared vengeance should he break the legendary prohibition. Nearly beneath the arch are the remains of an ancient altar built doubtless by the cliff-dwellers, indicating that the bridge was probably an object of superstitious worship, even to this ancient people" (p. 1053).

Photo by Joseph E. Pogue

THE RAINBOW ARCH AS SEEN FROM DOWN-CANYON: HEIGHT, 308 FEET; SPAN, 278 FEET

Its isolated position and remarkable symmetry are well shown by this photograph. The bridge is at once the largest and most remarkable known. Not only in size but in shapeliness does it surpass any of its rivals (see page 1054)

Photo by Joseph E. Pogue

A PORTION OF THE ARCH AS SEEN FROM THE BOTTOM OF THE GORGE AT SOME DISTANCE DOWN-CANYON

It would easily span, with room to spare, the dome of the Capitol at Washington, or, if hung over the Flatiron Building in New York, its limbs would come within a few feet of the ground, through to the west of Fifth Avenue on the one hand, and to the east of Broadway on the other (see page 1053).

yon wall on its downward curve. The opening, augmented by a gorge cut by the stream to a depth of 80 feet below the level of the supporting bench, measures a vertical distance of 267 feet; but the total height from stream-bottom to the top of the arch is 309 feet, while the abutments at their base stand 278 feet apart. The causeway, upon which one may be lowered from an adjacent cliff, but whose sides are too steep to serve for a complete passage, is 33 feet wide by 42 feet thick at its keystone point; and the limbs are not greatly in excess of these dimensions.

A mere recitation of figures must fail to convey an adequate idea of the imposing nature of the bridge. It is not the size alone, though this far exceeds the greatest masonry arches constructed by engineering skill; nor is it solely the graceful lines or curvature of maximum stability, but rather all of these, that combine to make this the most remarkable single arch now known. It would easily span, with room to spare, the dome of the Capitol at Washington; or, if hung over the Flatiron Building of New York, its limbs would come within a few feet of the ground, though to the west of Fifth Avenue on the one hand and to the east of Broadway on the other.

The arch is carved from a buff-colored, fine-grained sandstone, brick-red upon its surface and stained with vertical streaks of a darker shade. Mostly massive, though in part oblique-bedded, the rock is only moderately firm, and is easily crushed beneath the blows of a hammer. Geologically it is a part of the Upper La Plata sandstone, a formation of great thickness, deposited in Jurassic time over a large portion of southeast Utah, southwest Colorado, and northeast Arizona.

The origin of the arch is simple and evident. It was caused by the progressive narrowing of the neck of a meander intrenched between high and steep walls, until an opening was made through the tongue of intervening rock, permitting the stream to cut off its meander by flowing beneath the arch thus formed. The hole, once made, has been enlarged and given its present shape by the combined action of weathering, expansion, and contraction due to changes in temperature, and the carving effect of wind-blown sand, all of which unite to produce the rounded rock-forms so characteristic of this region. The abandoned arm of the meander is present and unmistakable, indicating the former course pursued by the stream.

Though doubtless requiring many years for its formation, the arch is nevertheless a very recent geological feature, and destined to withstand the forces that gave it being for only a brief period as geologic time is reckoned.

The bridge was first visited by white men and its existence made definitely known on August 14, 1909. It was then reached by a party consisting of W. B. Douglass, of the United States General Land Office, with four assistants; Byron Cummings, of the University of Utah, with three students; John Wetherill, of Oljato, Utah; and two Piute Indians, Jim and Nasjabegay. Douglass was acting under instructions from the Department of the Interior, dated October 20, 1908, to investigate a reported natural bridge in southeast Utah, with a view to making it a national monument if found of sufficient interest. An attempt was made in December, 1908, to locate the bridge, but was abandoned on account of snow. The search was renewed in August, 1909, the party being joined at Oljato by Cummings, Wetherill, and the three students. The arch was surveyed by Douglass, and the figures herein used, as well as the details of its discovery, are taken from his official report to the Land Office.

The bridge was undoubtedly known to the Indians prior to its discovery by white men; but as to the actual knowledge of it there is uncertainty. Douglass relates that Whitehorsebegay, his guide, on a second visit to the bridge, would not go beneath the arch, but laboriously clambered around one side whenever it was necessary to pass. Later Mrs. John Wetherill, an accomplished Navaho linguist, ascertained from an old Navaho that the arch is supposed to represent the rainbow, or sun-path, and one who

Photo by Joseph E. Pogue

VIEW OF A PORTION OF THE ARCH FROM A POINT NEARLY BENEATH

The causeway, upon which one may be lowered from an adjacent cliff, but whose sides are too steep to serve for a complete passage, is 33 feet wide and 42 feet thick at its keystone point, and the limbs are not greatly in excess of these dimensions (see page 1053).

passed under could not return without a certain prayer. Evidently Whitehorse-begay had forgotten this prayer and feared vengeance should he break the legendary prohibition. Nearly beneath the arch are the remains of an ancient altar, built doubtless by the cliff-dwellers, indicating that the bridge was probably an object of superstitious worship even to this ancient people.

The bridge is at once the largest and most remarkable known. Not only in size but in shapeliness does it surpass any of its rivals. Below is tabulated for comparison the dimensions in feet of the largest of the natural bridges, the measurements of the first four taken from the surveys of W. B. Douglass.

The exact location of the bridge is latitude 37° 03′ 21″ and longitude 110° 56′

| | Height. | Span. | Width. | Thickness. |
|---|---|---|---|---|
| The Barohoini (rainbow) or Nonnezoshe (stone arch), southeast Utah. | 309 | 278 | 33 | 42 |
| The Sipapu (gate of heaven) or Augusta, southeast Utah | 220 | 268* | 31 | 53 |
| The Kachina (guardian spirit) or Caroline, southeast Utah | 210 | 277† | 44 | 50 |
| The Owachomo (rock mound) or Edwin or Little, southeast Utah | 106 | 180 | 28 | 9 |
| The Virginia Natural Bridge | 200 | 45 | .. | .. |
| Pont d'Arc, France | 197 | 213 | .. | .. |

* Arch skewed; span with axis, 283 feet.

† Mean span, 275 feet; greatest span, 350 feet; least span, 202 feet.

Photo by Joseph E. Pogue

ONE LIMB OF THE ARCH PHOTOGRAPHED FROM THE BASE OF THE OPPOSITE LIMB

This picture brings out, perhaps, more than any other the imposing proportions of the structure

48″ west of Greenwich (Douglass), in San Juan County, Utah; six miles northward from the Arizona-Utah boundary line; four miles west of north from the summit of Navaho Mountain, and four miles above exit of the bridge canyon into the Colorado River at a point 16 miles below its confluence with the San Juan.

The most exact directions for reaching the bridge would be inadequate, so obscure and devious is the trail leading thereto; hence the services of a guide are indispensable. Oljato, Utah, where guide and outfit for the final portion of the trip may be secured, is reached by two routes, between which there is little choice. On the one hand, Gallup, New Mexico, on the Santa Fé line, may be made the starting point, whence one must go by stage 35 miles to Fort Defiance, Arizona, and from there by wagon or pack outfit 155 miles in a northerly direction to Oljato. On the other hand, the traveler may leave a branch of the Denver & Rio Grande Railroad at Dolores, Colorado, stage 81 miles to Bluff, Utah, and there secure horses for the remaining 60 miles to Oljato. The bridge is distant from Oljato only 37 miles, as the crow flies, but the trail passes over twice this distance, and three days will be required for this last and most difficult part of the trip. A minimum of 18 days should be allowed for the round trip, whether the start be made from Gallup or Dolores, and the journey may be accomplished at any time during the year save in winter. The trip is an extremely arduous and toilsome one, and would be fraught with danger to an inexperienced traveler, but under competent guidance may be accomplished with no special hazard, though hardships and inconveniences, and many of them, must be expected.

The government has already made of this natural wonder a national monument, thus preserving it for all time against vandalism and commercialism and conserving it for the enjoyment of all.

# THE MYSTERIES OF THE DESERT

*The following article is abstracted from "Across the Sahara," by Hanns Vischer, one of the few explorers who have traversed Tripoli and the Sahara to Bornu:*

THERE are many hamadas in different parts of the Sahara. The Hamada el Homra, the red wilderness, stands first among them all (see map, page 1047).

The great range which bars the road to the south between the coast and Fezzan rises here in one great, solid plateau of chalk to a height of 1,800 feet above the sea-level. It is a mighty sheet of rock falling off to the east, 360 miles from east to west and about 140 miles broad where the road crosses it.

Except for a few narrow depressions, which lie like islands in the surrounding desolation, the surface is of solid rock, covered everywhere with small red stones and little bits of chalk, doubtless the remainder of former layers which have long ago disappeared. Heat and cold break up the surface, and the incessant wind carries away every loose particle of sand, finally piling it up into large dunes somewhere in the desert around. The surface is swept clean as with a broom, and the polishing action of the drifting sand gives the stones the appearance of being varnished.

The hot air trembles over this shining surface, reflects the blue of the sky in every little depression of the ground, and distorts distant objects into fantastic shapes. Hollows in the rock appear as dim, blue lakes, and wandering camels on far-off rocks are transformed and magnified into the semblance of dark palm groves or strange-shaped hills. These are the games the hamada devils play to terrify and mislead the luckless caravans. For five days in the Hamada

el Homra the horizon lies around the traveler in one unbroken line—one infinite plain as far as the eye can see.

In the wilderness we had left behind us the ever-varying mountains rested the eye, and the mind instinctively imagined green fields and trees somewhere beyond the ridges. Here in the hamada, however, the desert, naked and hopeless in its desolation, lies ever before one. By day or by night, nothing interrupts the stillness of death save the mournful notes of the wind sighing among the stones. The endless disk of red rock over which the caravan slowly marches is closed in by the arch of the sky, steel-blue to the very edge of the horizon. And in this sky is set "a tabernacle for the sun, which is as a bridegroom coming out of his chamber, and rejoicing as a strong man to run a race. His going forth is from the end of the heaven and his circuit unto the ends of it, and there is nothing hid from the heat thereof." Only dawn and sunset paint earth and sky with colors more glorious than pen can describe.

The wonderful clearness of sun, moon, and stars, as they move through the silent heavens; the divine beauty of morning and evening—all bear the sign of eternity, before which man's wildest imaginations fall into insignificance. This is, indeed, the Garden of Allah; not of the bountiful God who is worshiped with harmonious chants of love in the soft, incense-laden atmosphere of a cathedral, but the Jehovah of Israel, a consuming fire, on whom no man can look and live.

A little speck on the endless plain, the caravan advances, pressing forward in anxiety to leave this abode of death, where shouts and laughter cease and the human voice is drowned in the heavy stillness.

### SINGING MOUNTAINS

The highest and most prominent point in the range is a mountain called Jetko, a dark and forbidding rock frowning over Bilma and the southern end of the oasis. This mountain warns the inhabitants of the approaching arrival of a caravan, for when it "sings" the men know that a caravan is close at hand. The noise is produced by the blowing of the wind from a certain direction through the crevices of the torn rock. It was clearly heard by the French officers one night. Commandant Gadel says, in his report: "On the 6th of October, in the morning, the old Liman came to tell me that the mountain had spoken. On the 8th of October, at 10 in the morning, the first Asbin caravan arrived. It consisted of 4,851 camels and 857 men. The mountain had not lied." *

Awaiting a scientific explanation, we can only note these facts. The desert is still full of mysteries. Major Djamy Bey told us that while in the neighborhood of Ghat, a Tuareg one day drew his attention to some large clouds which appeared most unusually on the horizon. The Tuareg assured the Bey that these clouds only showed when there was a large caravan on the road from Ganet, and two days later a special messenger brought the intelligence that a French expedition had arrived at Ganet! By similar clouds the Tuaregs maintained that they could foretell the arrival of every large caravan long before they had any other definite news of it. The mountain Jetko sang even while I was with the French at Bilma. And the caravan came.

One morning we noticed far out on the west, on the round, brilliant backs of the sand dunes, long dark blots. Quite imperceptibly they increased in size and drew nearer, like the great shadow of a cloud. It was an Asbin caravan of over 8,000 camels and 1,000 men. The arrival of these caravans is naturally the most important event of the year to the people of the oasis. The Asbinawas bring millet and grass from Air, wood for camel saddles, Manchester cloth, Hausa robes, and all the luxuries which can be found in the Kano market. Men, women, and children arrive from all the villages to buy their provisions for the year, which the Tuaregs give them in exchange for salt and dates. Formerly the Asbinawas forbade the inhabitants to cultivate millet, in order to force them to work the saltings and grow dates.

* Gadel, "Notes sur Bilma et les oasis environnantes," Revue Coloniale, Juin 1907.

The great encampment, with the many thousand camels, the stacks of grass, and piled-up loads, looked like an immense fair. The oasis, of course, could never support all these animals, so the Asbinawas, before they leave Air, feed up their camels on the fattest grazing grounds, and then, having chosen only the fittest animals, load about a third of the number with grass, which is used for fodder on the way. Great quantities are buried in the sand at intervals, to be used on the return journey; for on that desolate stretch of desert, water is very rare and not a blade of grass grows between the interminable sand dunes.

For us the arrival of this caravan was most welcome. Every member of my little family went out to buy stores and provisions for the march to Bornu, for which we were getting ready.

### SCENES AT MURZUK

In the Fezzan of today one meets representatives of almost every tribe from Egypt to Timbuktu, from the Mediterranean to Lake Chad; descendants of slaves and conquerors, original inhabitants and refugees.

Everywhere one finds the remains of great square towers, once citadels that stood in the middle of large towns. The grass huts of the inhabitants vanished before the fire and sword of the successive invaders, leaving nothing to recall their existence but the huge, solid citadels, built of salt-saturated mud, which defy the surrounding desert. Murzuk survived longest, as it was situated on the route from Tripoli to Bornu and to Ghat, and immense caravans continued to pass between the coast and Kuka. But it was an artificial existence, for most of the wealth was in the hands of the foreign traders.

With the subsequent European occupation of equatorial Africa, the export of slaves ceased and the Tuareg and Tubbu brigands became the lords of the desert, as the well-armed Arab caravans of former days grew fewer and fewer.

Murzuk has now lost its last source of income, and the Turkish administration of today is faced with the difficult problem of the confidence of the people in the value of their own country, independent of the Arab trans-Saharan trade.

The town of Murzuk lies in a well-watered natural depression at the southern and lower end of the hamada. Southward the open desert, with its bright yellow dunes, stretches to the very walls of the town. East and west, in irregular groups, the green palm groves follow the direction of the hofra.

Murzuk is built in the fashion of all Bornu towns, and like them it is surrounded by a number of large pits whence the material was taken for the great mud castle and the houses. Most of the pits are filled with stagnant water, which accounts for the innumerable mosquitoes and the bad health of the Murzuk people. In the middle of the dry and healthy desert, the inhabitants of Murzuk always suffer from malaria, and nearly all the former travelers complained of bad health during their stay there.

Right through the midst of the town runs the Dendal, the high street, with the market-place at one end, near the last gate, and the castle and the mosque at the other. Just like every town and village in Bornu, the town walls still surround an extent of open ground which was never built over, but has been used for growing crops in time of siege.

There is so much salt on the surface of the ground all through the depression that the mud-built walls of the buildings look as if they were covered with a hoar-frost, which sparkles and glitters in the sun. The salt mud gets extremely hard when it dries, and this accounts no doubt for the solid appearance of the old castles, which for centuries have withstood the ruin of the encroaching desert. On the other hand, when an occasional rainstorm comes over Fezzan it is disastrous to the buildings which happen to stand in its way. I was told of one town, Temahint, which was completely wiped out; or, to be more accurate, washed out, by an unusually severe rainstorm.

I had in my own house a large, solid waterpot; and, after the fashion of my country, used the water carelessly till to my amazement I saw the pot suddenly

slide through the hole which the water had made to the floor below!

The fort of Murzuk is an enormous structure, not unlike a gigantic ant-heap, of hard mud pierced by dark passages leading to spacious rooms, which are lit by a few small windows.

But it is the women of Murzuk who give all the vitality and color, and if the town, and with it the whole Fezzan, ever rises from its present miserable condition, it will surely be mostly due to the spirit of these gay Fezzan ladies. Free from the restraining laws of the stricter people of the north coast, the Fezzani girls have no use for the veil and believe little in the sanctity of the harem. Their laughter, which resounds above all the more serious noises of a market, is like that of children, and if their jests sometimes verge on the improper and their manners are not ruled by the laws of the Koran, they have most cheerful manners, in which the eternal feminine, the gaiety of the negro, and the ready tongue of the Tripolitan blend together, even as all the wit and humor of Kanuri, Hausa, Targhi, and Arabic have been collected in their language.

Their complexions, so refreshing after the veiled mummies of North Africa, are of all the shades, from ebony-black to light *café au lait*. The commonest type of face is like that of the Sphinx at Ghizeh, with straight nose, large mouth, and merry, thick lips, always ready to break into a smile. They are dressed in a sort of chemise, dyed with indigo and embroidered down the front, like those worn by Kanuri women. Over this they wear a long piece of blue cotton cloth slung round the body in all sorts of fashions and tucked in close under the arms. Over their heads and the greasy hair, falling in many small tresses on both sides of the face and slimy with rancid camel butter, they wear, like a mantilla, a square piece of woolen cloth, dyed a bright red. With their large silver earrings, heavy bangles and anklets, shrill but not unpleasant voices, henna-dyed hands, coal-black eyes, and shining white teeth, their whole appearance expresses a gay defiance of the melancholy desert which surrounds them.

THE TUAREGS (SEE ALSO PAGE 1046)

The Tuaregs, found in the vilayet of Tripoli, are descended from the Auxoriani of old, who in the fourth century took Leptis from the Romans after eight days' siege. Later they were driven west and lived with the Hoggar Tuaregs, who finally quarreled with them and forced them to migrate. They then settled around Ghat and devastated the country, according to their usual fashion.

Amongst the Tuaregs it is man the brute who by all the laws of the country has to obey the women. Descent is traced through the mother; woman shows her proud face to all the world, while the man goes veiled. In the presence of a woman of noble birth, men cover their faces and heads altogether. The women give the children what little instruction they have and train them to respect and obey them.

Bullied and worried by his womenfolk, the Tuareg has no liberty at all. All the goods, tents, camels, and clothes are the women's property. The stick he carries and the great wooden box into which he puts what his wife suffers him to have are all the man possesses and all he retains if for some reason his wife chooses to divorce him.

In Ghat, when a man goes out after sunset he is usually followed by a negro servant, sent by his wife to dog his steps, and woe to him if he forgets himself or comes home too late! He will find the door shut and must count himself lucky if he is not put onto the street altogether.

The young man who, in spite of all this, wants to marry must pay a heavy sum for the bride, to obtain which he is obliged to look for other means than his usual work of rearing camels or carrying goods for the Arab trader. Thus he is forced into taking part in one of the annual *rhazzias*.

The ladies decide when the right moment has come, and the men sally forth against some luckless caravan or to the rich highlands of Tibesti. These senseless raids have destroyed many a fertile oasis, and have accelerated the final disappearance of trans-Saharan trade.

## PROGRAM OF MEETINGS OF THE NATIONAL GEOGRAPHIC SOCIETY

Realizing that the largest available auditorium is inadequate to accommodate all members of the National Geographic Society who desire to attend the lecture course, the Board of Managers have arranged to give each lecture during the season of 1911-12 twice on the same day, in the same hall (the New Masonic Temple).

The first lecture will be at 4.50 p. m. and the second at 8.15 p. m.

The afternoon and evening lectures will be identical in all respects. The majority of the addresses will be published in the magazine of the Society.

**November 17.**—"Present Conditions in China." By Mr. Frederick McCormick. Mr. McCormick was for many years Associated Press correspondent at Peking, and is personally acquainted with the leaders of the recent government changes in China. He speaks Chinese and is a student of Chinese literature and history. His articles in *The Outlook*, *Century Magazine*, etc., have made him well known to the American public.

**November 24.**—"Tripoli of Barbary: the Gateway to the Sahara." By Mr. Charles W. Furlong, author of a fascinating volume on the same subject. It was Mr. Furlong who located, in the harbor of Tripoli several years ago, the wreck of the U. S. frigate *Philadelphia*, which was sunk by Decatur in 1804.

**December 1.**—"Italy of Today." By Mr. Arthur S. Riggs. Mr. Riggs will give an account of the Italians and describe some of the art treasures of Italian cities. The lecture will be wonderfully illustrated with colored lantern slides and moving cycloramas.

**December 8.**—"The Young Turks." By Rear Admiral Colby M. Chester, U. S. Navy.

**December 15.**—"The Blackfeet Indians." By Mr. Walter McClintock, author of "The Old North Trail" and adopted son of Chief Mad Wolf.

**January 5, 1912.**—"A Woman's Climbs in the High Alps: the Ascent of Monte Rosa, the Breithorn, the Matterhorn, and Mont Blanc." By Miss Dora Keen. With colored slides and motion pictures.

**January 12.**—"The Balkan States: Montenegro, Servia, and Bulgaria." By Mr. E. F. Newman. The ambitions, beauties, and romance of this picturesque part of Europe will be described by one who knows them well. With colored slides and motion pictures.

**January 19.**—"What the Japanese Have Done for Formosa." By Dr. Inazu Nitobe, of the University of Tokyo. Illustrated with colored slides.

**January 26.**—"Morocco and Her Neighbors." By Mr. Frank Edward Johnson, author of "Tunis," "The Molemen," etc., in the NATIONAL GEOGRAPHIC MAGAZINE. Illustrated with colored slides.

**February 2.**—"How the World is Fed." By Dr. H. W. Wiley, Chief of the Bureau of Chemistry of the Department of Agriculture. Illustrated with colored slides.

**February 9.**—"Personal Experiences in the Far East." By Mr. George Kennan, author of "Tent Life in Siberia," "Siberia and the Exile System." Illustrated with colored slides.

**February 16.**—"From the Amazon to the Orinoco: the Five Guianas—Brazilian, French, Dutch, British, and Venezuelan." By Mrs. Harriet Chalmers Adams. With colored slides and motion pictures.

**February 23.**—Dr. Alexander Graham Bell will address the Society. The subject of the lecture will be announced later.

**March 1.**—"The Oceans and Their Inhabitants." By Hon. O. P. Austin, Chief U. S. Bureau of Statistics and Secretary of the National Geographic Society. With colored slides and motion pictures.

**March 8.**—"The Glaciers of Alaska." By Prof. Ralph S. Tarr, of Cornell University, and leader of the National Geographic Society's Alaskan expeditions of 1909-1911. Illustrated with colored slides.

**March 15.**—"A Naturalist's Observations in Colombia." By Mr. Frank M. Chapman, of the American Museum of Natural History. Illustrated with colored slides.

**March 22.**—"In the Wilds of Brazil, with an Account of Roraima and Kaieteur—the Great Mountain and the Great Falls of the Guianas." By Dr. Henry E. Crampton, of the American Museum of Natural History. With colored slides.

**March 26.**—"Paul at Athens." By Dr. Mitchell Carroll, Secretary of the Archæological Institute of America.

**March 29.**—It is hoped that Captain de Chambrun, military attaché of the French Embassy, will be able to accept the invitation of the Society to give an address on "French Explorations in Africa." Count de Chambrun has taken a distinguished part in the exploration of North Africa, and has made notable contributions to our knowledge of portions of the continent.

**April 5.**—"Japanese Gardens." By Miss Eliza R. Scidmore, author of "Jinrikisha Days in Japan," "China, the Long-lived Empire," "Java, the Garden of the East," etc. Illustrated with colored slides.

**April 12.**—"Man's Deadliest Foes: the Fly and the Mosquito." By Dr. L. O. Howard, Chief of the Bureau of Entomology; author of "Mosquitoes: How They Live," "The House Fly," "The Insect Book," etc. With colored slides and motion pictures.

PHOTO BY BOUGAULT

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## THE PALMS

Groves whose rich trees wept odorous gums and balm;
Others whose fruits, burnished with golden rind.
Hung amiable * * * * and of delicious taste.—*MILTON.*

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THE NATIONAL GEOGRAPHIC MAGAZINE

# THE SACRED CITY OF THE SANDS

## With an Account of the Extraordinary Tortures Welcomed and Endured by Devotees at Kairowan

BY FRANK EDWARD JOHNSON

SHORTLY after the death of Mohammed "the Prophet" (632 A.D.), founder of the Moslem faith, the Arab invasion swept like a whirlwind from India through northern Africa to the Atlantic Ocean. This vast army of victorious Moslems created with remarkable rapidity an immense empire, where the sciences, arts, and letters played an important rôle.

Having in a few years conquered Asia Minor, Persia, and Egypt, the Arabs determined to invade Barbary (Tripoli of Barbary) and Ifrikïa (Tunisia), under the leadership of Caliph Abdallah ben Bou-Sark, with 10,000 cavalry and 10,000 "Fantassins." Had the Byzantines united with the Berbers they could easily have repulsed the invaders; but the Patriarch Gregory chose this moment to revolt against the Emperor and take the "purple" at Suffetula (Sbeïtla).

Gregory sent 10,000 men against the Arabs, who had already passed through Tripoli of Barbary, but he was defeated and killed at the battle of Akouba, and all the region of southern Tunisia fell into the hands of Abdallah. He treated the natives so well that they were converted to Mohammedism. Serious trouble having broken out in the Orient, the Arabs did not pay much attention to Tunisia until 661, when the Caliph was assassinated by a fanatical Kharedjite. To punish the people, a swarm of Arab cavalry advanced as far as Sousse under Sidi Okba ben Nafa, later governor of Tunisia. He founded in 669 the town of Kairowan, in the midst of an arid desert and salt marsh.

Okba ben Nafa kept on his victorious march until he reached the Atlantic Ocean. The Berbers and Byzantines united to try and defeat him. On his return march he was attacked by the tribe of Aurēs, who were inflamed by Koceïlah, a Berber prince, whom Sidi Okba had taken captive and attached to his suite as a slave.

Okba ben Nafa and 300 of his followers were killed after a desperate fight at a small oasis near Biskra, and the tomb of Sidi Okba is greatly venerated to this day.

Legends tell how Okba ben Nafa chose the site of Kairowan, in the midst of a desert, where nothing grew and where no water was to be found, saying that if a great city could be built there it would be a miracle permitted by

Photo by Lehnert & Landrock

"HE IS ABSOLUTELY HAPPY AND THANKS GOD (ALLAH) FIVE TIMES A DAY FOR ALL HIS BLESSINGS AND FOR THE BEAUTY AND LIBERTY OF HIS SAHARA HOME" (SEE TEXT, PAGE 1093)

Allah's grace. Another legend says that the desert was infested with horrible snakes, vipers and scorpions, and wild beasts, and that Sidi Okba threatened maledictions upon all these creatures unless they went away. Of course they left immediately, never to return. The probable reason for building a town in the desert was its geographical position. What terrors could a desert wilderness have to these hardy Arab conquerors, direct descendants of Ishmael, the son of Abraham by Hagar? They had lived, thrived, and multiplied in the desert.

Carthage, Tunis, Sousse, and Sfax were strongholds of the Byzantines. They doubtless could have been taken by Sidi Okba, but then they would never have been secure from the attacks of the Byzantine fleets. The Arabs knew nothing about the sea and still less of boats and naval warfare. But the desert had terrors for the Byzantines, and that great arid wilderness surrounding Kairowan made it secure from sudden attack and was admirably suited to cavalry combats, that were the delight of Sidi Okba and his men (see map, page 1089).

The sacred city of Kairowan has today 85 mosques and 90 zaouïa praying places, or Moslem schools. After Mecca and Medina, it is the greatest Mohammedan shrine. One pilgrimage to Mecca makes an Arab or any Mohammedan a "hadj," or pilgrim, and he is always addressed as "sidi hadj."

Seven pilgrimages to Kairowan are required before one becomes a hadj. For a radius of several hundred miles the bodies of the "faithful" are brought to Kairowan for burial in "holy earth," and it is owing to the regal bequests of past generations that Kairowan is able to keep up all these mosques and zaouïa.

Kairowan is the only town in Tunisia where infidels can enter the mosques. It was taken by the French without one shot being fired. A famous maribout had prophesied years before that Kairowan would be taken by the French, and the people believed that it was preordained.

On entering the city a clean and healthy place was needed for a hospital, so they took the Grand Mosque of Sidi Okba. Once profaned by infidels, it did not matter if they continued coming to see it; and, if they entered the Grand Mosque, naturally they could enter the others.

A Frenchman came to Tunis several years ago from Algeria, where one is allowed to enter any mosque. He entered the mosque of Sidi-Mahrez, near the Place Bab-Souika; he was attacked and almost killed, as he resisted the Arabs who tried to put him out. Since then a large sign in French, Italian, English, and German is placed before each entrance to a mosque: "Reserved for Moslem worship. Entrance forbidden."

The history of Kairowan is extremely varied and interesting. Until 1881 no foreigner had ever entered its gates and left alive, and today it is the most beautiful Saracen town in existence and contains within its walls a unique collection of architectural fragments of Roman and Byzantine periods of marvelous beauty.

Carthage, El-Djem, Hadrementum, Thyna, and Sbéitla were the quarries where the Saracens took all that they considered worthy to be put into their mosques. Between five and six centuries, when architectural decoration was at its height, had just passed, so that the Arabs had marvelous works of art to choose from.

How they ever transported all those huge columns and blocks of marble will remain a mystery. Sfax and Sousse were the two nearest towns, and the Mediterranean was about 80 kilometers (50 miles) away from Kairowan. Being a sacred town, Kairowan has attracted all the various sects of Moslems and led to many complicated theological disputes. We think of Mohammedans as believing in Allah and "Mohammed the Prophet," and that is about all we know.

The Koran is a difficult book to understand, and after the death of Mohammed four commentaries were written and have been accepted through the Moslem world. They are classified as follows: "Rite of Malickite," "Rite of Hanifaite," "Rite of Hambelite," and "Rite of Scha-

Photo by Lehnert & Landrock

A HALT BETWEEN OASES IN THE SAHARA DESERT

A WANDERER IN THE DESERT: THE WAVES OF SAND ARE CAUSED BY THE WIND

Photo by Lehnert & Landrock

Photo by Lehnert & Landrock

A CARAVAN IN THE SAHARA DESERT JOURNEYING TO KAIROWAN

fieite." These are the four great divisions of Mohammedism today. The follower of one rite can worship in the mosque of any other, and there are other rites considered outside the pale; but the gist of their religion lies in the words one hears five times a day from the tops of the minarets: "Allah is Allah! There is no god but Allah! Mohammed is his prophet!"

### THE GRAND MOSQUE OF SIDI OKBA

Two of the mosques deserve especial attention, the Grand Mosque of Sidi Okba and the Mosque of the Barber. The best view of the Grand Mosque of Sidi Okba is from outside the walls of the city, for the narrow streets prevent one from seeing anything except the top of a fluted dome or here and there a minaret (see page 1070).

This great mosque is said to have served as a university for the teaching of Mohammedism during the early times. It has a huge rectangular courtyard with a double arcade of arches, or cloisters, on three sides.

To the right of the entrance is the mosque and its fluted domes, and double columns are used instead of single. To the left of the entrance is a large and curious-shaped minaret, and underneath the floor of the courtyard are enormous cisterns for holding rain-water.

The view from the top of the minaret, once seen, is never to be forgotten. Looking back at the façade of the mosque, one sees a creamy white flat-roofed Oriental town with numerous fluted domes and minarets; a great wall winding in and out and encircling Kairowan; far away in the distance a bluish-pink chain of mountains; everywhere else an arid waste of sand and sage-brush (see page 1072).

The custodian having opened some richly carved wooden doors, we enter the mosque, having first removed our shoes, for then we can walk wherever we like.

Mats made of esparto grass cover the floor, and these must be rolled up unless one has removed one's shoes. A series of large wooden doors extend almost the entire width of the mosque. On great occasions these doors are opened wide, so that the throng of worshipers may join in the service with those in the mosque, and they tell me it is very difficult to get into the courtyard, owing to the crowd (see page 1080).

No description, photograph, or painting can render the effect of the interior of the mosque of Sidi Okba. It is overwhelming—columns of colored marble, porphyry, alabaster, and granite; beautifully wrought capitals of Ionic, Corinthian, or Byzantine design. Egyptian and Roman capitals are to be seen next to others from Constantinople or Jerusalem. There may be a capital of one period with the column of another period and the base of a third (see page 1078).

The ensemble is remarkable for the hundreds of columns, and great arches give an impression of grandeur seldom equaled. The central nave is wider than the others, and at the end is the "sacred niche," or "mihrab," that shows the direction of Mecca, and toward which all Moslems turn when praying. The central nave is decorated with several large candelabra of bronze, on which are fastened countless small glass lamps, like a night light, filled with olive oil (p. 1079).

Near the mihrab is the "mimber," or pulpit, composed of wonderfully carved wooden panels, said to have been carved at Bagdad about the ninth century. They are famed all over the world, and their designs have played an important rôle in the history of decorative art.

In the mosque are superb twin columns of porphyry; they do not stand parallel, but widen as they ascend. Any one who can manage to squeeze between them is pure and just, and all Mohammedans try to force themselves through.

### THE MOSQUE OF THE BARBER

The Mosque of the Barber is so called because Abouzoumat Obeïd Allah ibu Adam le Belaouï was Mohammed's barber and companion. He preserved three hairs of the beard of the Prophet, and they are buried with the body of "the barber" in the Mosque of the Barber,

Photo by Lehnert & Landrock

"HIS ONLY DWELLING IS A CRUDE TENT MADE OF CAMELS' AND GOATS' HAIR" (SEE PAGE 1093)

which is over half a mile outside the walls of Kairowan.

One enters first a large courtyard of the school, or zaouïa; doors open out of it, giving access to the rooms of the professors, students, and servants. The exquisitely hand-wrought stucco-work and the Moorish faience tiles remind one of the Alhambra. Parts of this mosque are modern, and show what the Arabs can do today. Alas, art is not encouraged or well paid, and as the old craftsmen die their sons cannot fill their places, and Arab art will soon be a thing of the past. After the courtyard of the zaouïa comes a small rectangular courtyard, open to the sky and most beautifully decorated in blue and green tiles. Above all is a fluted dome of creamy white against a soft blue sky. Opening out of this small courtyard is a large one with a graceful cloister extending on all sides.

Opening out of the patio is a room in which is placed the catafalque of "the barber." It is covered and surrounded with flags of vivid colors richly embroidered in gold and silver. Between the banners are hung ostrich eggs and bags containing "holy earth" from Mecca—votive offerings brought back by pious pilgrims. Scattered over the floor are numerous Oriental prayer-rugs and carpets, many of great value. At the foot of the tomb hangs a crystal candelabrum.

One notices marble doors and window-casings of Italian workmanship, and Henri Saladin tells the following story in his book, "Tunis et Kairowan":

During the 18th century an Italian doctor was captured by pirates and sold to a wealthy native of Kairowan. This man became very ill and his life was despaired of by the local doctors, but his Italian slave was most devoted and saved his life. On getting well the man of Kairowan gave the Italian doctor his liberty and great riches and sent him back to Italy. On his arrival there he ordered the marble doors and fittings one now sees in the Mosque of the Barber, and sent them as a present to his former master, who was most interested in the zaouïa and Mosque of the Barber.

It would take a large volume to describe all the various mosques and zaouïa of Kairowan. There is one more of especial interest, Mosquée de Sidi-Amor-Abbada, or the "Mosque of the Swords." This mosque owes its existence to a dwarf blacksmith who became a famous marabout. Being small, he had a mania for large things, and forged many great swords and battle-axes covered with verses of the Koran. He also made a huge Turkish pipe, or "chibouk," so tall that no giant could ever have used it. The Mosque of the Swords was built stone by stone, as pilgrims left their small or large offerings. The maribout dwarf lies buried in a huge tomb in the mosque. He died about 50 years ago, so that the Mosque of the Swords, with its five picturesque fluted domes, is the most modern mosque in Kairowan (p. 1071).

When Sidi Okba founded Kairowan there was no water. Ibrahim el Aglab, called the "Louis XIV of Tunisia," owing to his love of luxury and superb edifices, had two very large circular reservoirs built to the north of Kairowan, and they were known as the "Cisterns of the Aglabites." When the oued Merg-el-lil overflowed, the water was caught in the smaller of these two cisterns, where it deposited all impurities, then filtered through into the larger reservoir. They are said to contain over 100,000 cubic meters of water (about 2½ million gallons).

Thanks to the French administration, water has been piped from the springs of Chérichira, so that the Cisterns of the Aglabites have been restored and are filled with a never-failing supply of excellent water. "The inhabitants of Kairowan say that they are very grateful to the French protectorate for this water; but the fanatics add that if the 'roumis' (foreigners) have done these nice things, it is because they have been the instruments of Allah, who makes them work for the benefit of the 'faithful.'" *

In every town or village where Arabs dwell are to be found zaouïa or houses

* Quotation from Charles Lallamand in his book "La Tunisie."

Photo by Lehnert & Landrock

OUTSIDE THE WALLS OF KAIROWAN: THE MINARET, FLUTED DOMES, AND BUILDINGS TO THE LEFT ARE THE GRAND MOSQUE OF SIDI OKBA; IN THE MIDDLE FOREGROUND IS A NATIVE WELL

"Legends tell how Okba ben Nafa chose the site of Kairowan, in the midst of a desert, where nothing grew and where no water was to be found, saying that if a great city could be built there it would be a miracle permitted by Allah's grace" (see page 1067)

Photo by Lehnert & Landrock

"MOSQUE OF THE SWORD," OR MOSQUE OF SIDI AMOR-ABBADA, OUTSIDE THE WALLS OF KAIROWAN: THE FLUTED DOMES ARE SUPERB IN THE SUNLIGHT AGAINST A BLUE SKY: NOTE THE PRICKLY PEAR IN THE FOREGROUND (SEE PAGE 1069)

Photo by Lehnert & Landrock

PANORAMA OF KAIROWAN FROM THE MINARET OF THE GRAND MOSQUE OF SIDI OKBA, SHOWING CITY WALL

"It is the most beautiful Saracen town in existence, and contains within its walls a unique collection of architectural fragments of Roman and Byzantine periods of marvelous beauty. Carthage, El-Djem-Hadrementum, Thyna, and Sbéitla were the quarries where the Saracens took all that they considered worthy to be put into their mosques. How they ever transported all those huge columns and blocks of marble will remain a mystery" (see page 1067).

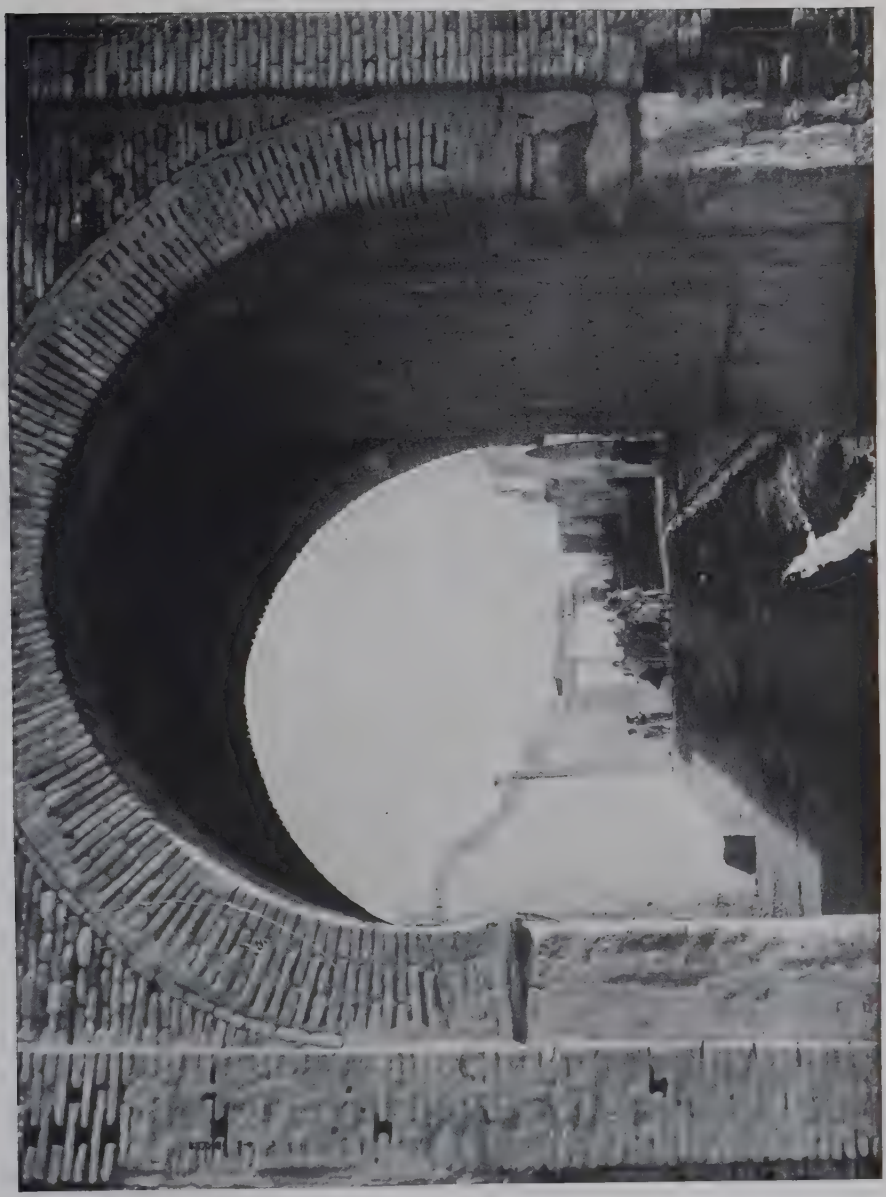


Photo by Lehnert & Landrock

ONE OF THE GATES OF KAIROWAN: NOTE THE THICKNESS OF THE CITY WALL

Photo by Lehnert & Landrock

ONE OF THE MOSLEM SCHOOLS, OR ZAOUIA, OF KAIROWAN, AND CITY WALL TO THE LEFT: THE SACRED CITY CONTAINS 85 MOSQUES AND 90 MOSLEM SCHOOLS (SEE PAGE 1063)

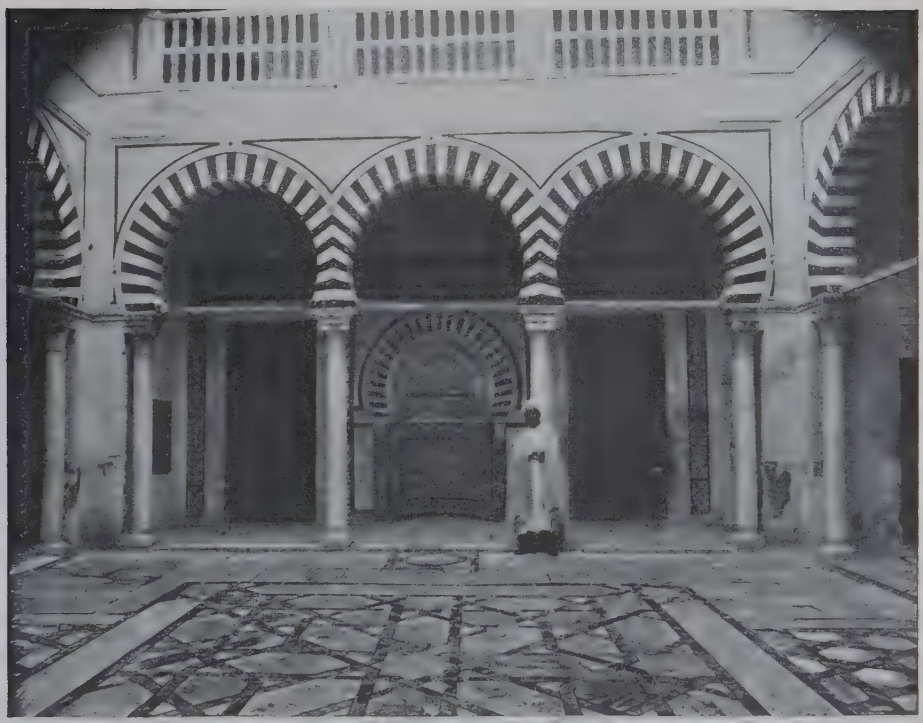


Photo by Lehnert & Landrock

INTERIOR COURTYARD OF ONE OF THE MOSLEM SCHOOLS, THE ZAOUIA OF SIDI ABID EL GAHRIANI: KAIROWAN

belonging to a Mohammedan religious sect called "Aïssaouas," or "Brotherhood of Jesus." This sect was founded by Sidi Mohammed ben Aïssa, of Meknés, Morocco, about 380 years ago, and is very largely followed in Tripoli of Barbary, Tunisia, Algeria, and Morocco. Owing to all mosques and zaouïa being open to foreigners in Kairowan, most people think the sect has headquarters there; but such is not the case. But it is the only place where infidels are admitted to watch their sacred rites.

Walking down several narrow streets, I entered the zaouïa of Sidi Mohammed ben Aïssa of Mecknés, small when compared to the large mosques of the Barber and Sidi Okba. It was late in June, and, owing to the great heat, all foreigners had left Kairowan that could, so that I was to be alone amidst hundreds of fanatics to watch their sacred rites, which take place every Friday afternoon throughout the year. A priest gave me a chair. Evidently a service had just been finished, for there were hundreds of Arabs in the building. Some went out, while others came in.

### SWALLOWING SCORPIONS ALIVE

The high priest, called a sheik; the second high priest, called a moudadem, and the third, called a caliph, and the elders of the zaouïa formed a large circle, sitting on the floor chanting and beating their tom-toms, now fast, then slow. Several rows of men and youths had stood themselves in line, bowing and swaying to the rhythm of the music. Faster and faster beat the tom-toms;

Photo by Lehnert & Landrock

STREET SCENE IN KAIROWAN

Photo by Lehnert & Landrock

ENTRANCE TO THE SOUKS, OR BAZAARS: KAIROWAN (SEE PAGE 1089)

Photo by Lehnert & Landrock

INTERIOR OF GRAND MOSQUE OF SIDI OKBA: KAIROWAN

"No description, photograph, or painting can render the effect of the interior of the mosque of Sidi Okba. It is overwhelming—columns of colored marble, porphyry, alabaster, and granite; beautifully wrought capitals of Ionic, Corinthian, or Byzantine design. Egyptian and Roman capitals are to be seen next to others from Constantinople or Jerusalem" (see page 1067).

Photo by Lehnert & Landrock

ANOTHER VIEW OF THE INTERIOR OF THE GRAND MOSQUE OF SIDI OKBA, KAIROWAN, SHOWING THE MIHRAB, OR HOLY NICHE (SEE PAGE 1067)

Note the huge candelabra with the countless small glass lamps, filled with olive oil

Photo by Lehnert & Landrock

A VIEW OF THE INTERIOR OF THE GRAND MOSQUE OF SIDI OKBA, KAIROWAN, SHOWING A SERIES OF OPEN DOORS

When great pilgrimages arrive or on special days, when the number of "the faithful" is so great that they cannot all enter the grand mosque, the doors are thrown open, thus making the huge courtyard a part of the mosque (see page 1067).

faster and faster swayed the lines of men.

After what seemed a long time a young man jumped from the front line and ran toward the chaoüche, or priest, who had arisen and given him his hand to kiss; whereupon he immediately stripped to the waist, keeping on only a pair of white Oriental trousers.

A wooden box full of scorpions had been brought over to me to look at. There were black, yellow, and white, and I knew from experience how dangerous they were. An under-priest, "bache chaoüche," stood upon a sort of stool and held high above his head a large scorpion by the tail. The fanatic howled, snapped, and jumped for it, the way a mad-dog snaps at persons, and his eyes had an unnatural stare and glassy look, and he foamed and frothed at the mouth.

After a few seconds the bache chaoüche dropped the scorpion into the fanatic's open mouth. He gave one snap and gulped it down alive, to be followed in an instant by another. By this time about 20 men and youths were stripped to the waist, all snapping and frothing at the mouth. The first fanatic came so near me that I could feel his hot breath on my face.

### RITES OF TORTURE

An under-priest had brought up two round swords the size of my little finger and about one meter in length. The chaoüche seized the flesh and muscles of the fanatic's shoulder, and, with a quick thrust, drove the florette through so that about 15 inches protruded on either side of the shoulder. He then did the same with the second sword to the other shoulder. Two more florettes had been brought up by an under-priest. All the swords had handles of hardwood shaped like a large ball.

The fanatic braced himself and the chaoüche, chanting a verse from the Koran, drove the sword into one side of the abdomen. The second sword was done likewise on the other side of the abdomen; and, with these four swords sticking into him, the fanatic walked about, and the bache chaoüche followed him and at every other step hit with full force, with a kind of sledge hammer, on the hard wooden balls fastened as handles to the swords, driving them deeper at every blow.

The leaves of the "prickly pear" had been brought in in large baskets, and other fanatics, instead of being thrust through with swords, laid down and rolled on a bed of prickly pear leaves (not the Burbank variety, without thorns), and men covered their bodies with more leaves. The chanting and beating of the tom-toms continued meanwhile.

The noise of the music and the you-you-yous of approval from the women, hidden behind great lattice screens; the close air and the odor of incense, mingled with the smell of sweat, made me almost nauseated. About 70 men—old, middle-aged, and young—underwent this terrible ordeal.

The swords were pulled out by the chaoüche or moudadem, who placed what looked like a large bandana handkerchief about the sword and over the wound and with great force jerked out the sword. The fanatic would throw his arms around the neck of the moudadem and cling to him, while he whispered a few words of comfort into his ear. Immediately his eyes would lose their glassy stare and his face relax and become normal.

### EXPLANATION OF THESE TORTURES

During my journey through the Troglodyte country, in extreme southern Tunisia, I was frequently permitted, as guest of the cadi, to see the Aïssaouas at their rites. One moonlight night, as everything was in full swing—Brebisch, Mohammed, and I sitting on the flat roof, the courtyard being too small to contain all that wanted to follow the service—the captain of the "Affaires Indigenes" came up with several officers leaving for Morocco the next morning. Immediately everything stopped. The officers were non-believers, and they would not continue their religious rites. No threats of imprisonment or punishment were of avail.

Photo by Lehnert & Landrock

A STREET SCENE IN KAIROWAN

Photo by Lehnert & Landrock

"PORTE DE TUNIS," KAIROWAN: PEPPER TREES ON THE RIGHT-HAND SIDE

ARAB KILNS FOR MAKING TILES: NEAR KAIROWAN

Photo by Lehnert & Landrock

Photo by Lehnert & Landrock

A NORIA (WELL): THE CAMEL WALKS AROUND AND AROUND AND BRINGS UP WATER IN THE POTTERY JARS, AND KEEPS THE RESERVOIR IN THE FOREGROUND FULL OF WATER FOR IRRIGATING PURPOSES

Photo by Lehnert & Landrock

ARAB WOMEN OF KAIROWAN

At the end of the seance the men would lie stiff on the ground, apparently dead. Only after rubbing and chafing their bodies and sometimes biting their ear would the fanatic come to. Five times during my stay at Foum Tatahouine I saw the same man—he keeps the large Arab café near the market-place—swallow from 8 to 15 ten-penny nails.

One curious fact is that members of this sect are always proof against the stings of scorpions and snake-bites, not only when under this sort of hypnotic spell, but when working at their daily tasks. I could not believe this statement until I saw it proved time and again. Do they die? do they bleed? were questions that I was asked frequently in America. If they die one never knows, and they should not bleed, and do not as a rule; but they bleed profusely once in a while, and this is what two of the high priests told me when I asked them about it:

"There are certain holy rules laid down by Sidi ben Aïssa. God is a God of love and kindness, but he will not be trifled with. We do not confess to priests or men. It is between oneself and God. A man must wash himself. He must be pure within.

"If a man has broken any of the commandments of the Koran, or defiled himself in any way and comes to the religious rites of the Aïssaouas, then he will bleed, or the fire will burn, or the scorpions will choke him. He must purify himself first; then all will go well."

The high priest is called a sheik; next comes the moudadem, then a caliph, then a bache chaoüche and chaoüche. A man called moharake shows people their seats and a bache taballe leads the tom-toms.

1. The hypnotized fanatic that eats Barbary figs (prickly pear), glass, etc., is called a camel; in Arabic, "djmmel."

2. The second is called a lion. He imitates a lion and eats sheep and bulls alive. "Saïdie" is the name.

3. The third is called an ostrich, or "rafeiy." He swallows nails, scorpions, and has swords thrust through him.

4. The fourth thinks himself a cat, "kat-oüss," and climbs trees and buildings and jumps down unharmed. He eats shoes and hot iron and swallows burning coals of fire.

5. The fifth, called in French "le merle," a species of blackbird; in Arabic, "háutiffa." He jumps down deep wells with his clothes on, and comes out dry and his mouth full of water. He also jumps and hops about like a bird.

6. The sixth and last is called "okascha." No one has ever been able to tell me its meaning. He is a sort of Samson, or strong man, and will break strong ropes or chains when bound. He seems to possess marvelous force, for I have seen 12 strong Arabs try to throw him, and he tossed them about like straw. Then the sheik himself had to go up to him; he was a wiry-looking old man. He passed his hand several times over the fanatic's face and he, with a gasp and groan, sank, apparently lifeless, to the floor. The strong man was trying to break down a stone wall with his head, and was in a very ugly mood, so that the 12 Arabs tried to throw him, so one of the chief priests could calm him.

* * * * * * *

The explanation for these various tortures is, word for word, what about 20 sheiks and moudadema told me when gathered together in the Café Douirat in Tunis. One sheik was a mighty hunter, whom I had met far south; another was from the Troglodyte town of Douirat; two others from near Gabes, and one from Kairowan. I told them what I had seen as a boy and recently in Tripoli and Tunisia, and that people in America would not believe that they did these things. So evenings we met and had heart-to-heart talks, and what I have written are the notes scribbled down on the spot. I cannot explain to you why they are not hurt. It seems impossible that a man run through the abdomen with a small round sword does not die, or at least feel the after-effects. As a well-known English surgeon said to me, on his return home from Kairowan,

Photo by Lehnert & Landrock

FIFTEEN MONTHS OLD: KAIROWAN

OUTLINE MAP SHOWING LOCATION OF KAIROWAN, TUNIS

"Why do they not all die of blood poisoning?"

The French quarter of Kairowan is built outside the walls, and consists of a station, two hotels, the house of the "controleur civile," the post-office, and the houses of the various officials. Kairowan has a population of over 20,000; but, owing to the life in the streets, a stranger would say twice as many inhabitants.

### THE ARABS ARE LOVERS OF JASMINE

The souks resemble those of Tunis on a smaller scale, and are picturesque. The end of June, about the time the sun sets countless Arabs carry about in large, platter-shaped baskets small packages wrapped in fig leaves—"jasmine; sweet, fragrant jasmine." Every Arab, rich and poor, day laborer or native prince, stops and buys for 10 centimes (2 cents) a small package, made of a fig leaf folded over three times and fastened together by a straw of esparto grass. On opening, an exquisite perfume exhales and one finds a large bunch of jasmine buds of delicate pink. The moisture of the fig leaves keeps them absolutely fresh and the buds from opening.

A blacksmith, busy at his forge, will stop shoeing a mule to run out and buy a big bunch of jasmine. He will fasten the stem in his turban or over his ear and return to his work, singing in a quaint minor key, and the words are:

"We render thanks to Allah for sending rain to make the crops grow and the flowers to bloom."

The youth apprenticed to the black-

Photo by Lehnert & Landrock

THE WAY ARABS WEAR FLOWERS: IN THEIR TURBANS OR STUCK OVER ONE EAR

(SEE PAGE 1089)

Photo by Lehnert & Landrock

A NOMAD GIRL OF THE SOUTH

Photo by Lehnert & Landrock

INTERIOR OF AN ARAB HOUSE: KAIROWAN

smith takes up the chorus as he works his Oriental bellows, and in a few moments the entire street of blacksmiths has joined in this weird song.

The Arab merchant showing me Kairowan rugs would point up and say: "Nothing so beautiful as the blue sky, bright sunshine, and the perfume of flowers"; whereupon he would inhale the jasmine and say: "The most beautiful mosque of Mecca, Damascus, or Kairowan is not half as beautiful as the vaulted blue of the sky to worship God in."

We of the West have much to learn of the East; the faith of a Mohammedan is sublime, and makes a nomad of the Sahara feel equal to any sultan, and his carriage and manners that of a prince. His only dwelling is a tent made of crude cloth of camels' and goats' hair; his only drink, water (brackish) and goats' milk; his food, dried dates, locusts, and a little barley; his only perfumes, tar, gazelle, and the few small flowers that bloom in the Sahara and that he uses also as medicine.

Before his tent is hobbled his horse and some camels. In the tent is a large wooden chest, some copper pots and pans, and a few oil jars. No furniture encumbers the interior. He can break camp in half an hour and move to some other spot with his wives and children. For a pastime he can hunt the gazelle and ostrich.

He is absolutely happy and thanks God five times a day for all his blessings and the beauty and liberty of his Sahara home.

Photo by Rollin T. Chamberlin

THE MILITARY ESCORT WHICH ACCOMPANIED US INTO THE SZECHUAN ALPS: THEY WERE SENT BY THE MAGISTRATE AT PI HSIEN TO SEE THAT NO HARM BEFELL US ON THE JOURNEY (SEE PAGE 1111)

# POPULOUS AND BEAUTIFUL SZECHUAN

## A Visit to the Restless Province of China, in which the Present Revolution Began

By Rollin T. Chamberlin

OF THE eighteen provinces of China, Szechuan is at once the largest, the most populous, in many respects the richest, and altogether the most picturesque and beautiful. This fair and far interior province, lying between the 26th and 34th parallels and extending from 98° to 110° east longitude, spans a latitudinal range little short of Florida and Georgia taken together and lies nearly antipodal to them in longitude. Its area of 181,000 square miles bears a population estimated at 50,000,000 to 70,000,000 (see map, page 1097).

The political bounds of Szechuan have been gradually shifted westward at the expense of Tibet, so that it now embraces the high mountains that border the Tibetan plateau, and these have thus come to be known as the Szechuan Alps. By this extension the western edge of Szechuan laps well up on the border of that great elevated tract of south central Asia which is the world's most declared expression of the stupendous deformative movements of the later Tertiary times. It is, however, only the ragged upturned eastern edge of the great elevation that is embraced in Szechuan; the plateau mass still lies in Tibet. As a result of these deformative movements, the surface of Szechuan has been divided into two portions of rather strikingly different aspect.

The western part, comprising somewhat more than half the entire area, is characterized by a remarkable parallelism of lofty ridges. Deeply sunken between these lie profound valleys and precipitous gorges, through which course the upper branches of several of the great rivers of southeastern Asia. On the summits of the ridges stand forth some of the grandest mountain peaks of the globe.

The eastern portion of Szechuan is accidented by much lower, even-crested mountain ranges trending northeast-southwest. Between these ranges lie open plains, butte areas, or broad hill tracts, giving the intermontane basins a general park-like aspect. The flat-topped parallel mountain ranges are highest and most prominent near the eastern edge of the province, where the Yang-tse Kiang in cutting through them has formed its famous series of gorges.

In general structure and aspect these eastern Szechuan ranges call strongly to mind our own Appalachian Mountains. Westward of the gorge ranges, toward the center of the province, the mountains generally die away and give place to picturesque red buttes. These are so prevalent and dominating and their coloration so marked that this central portion of the province has come to be known as the Red Basin of Szechuan.

### THE CHENGTU PLAIN

Heading far up in the recesses of the Szechuan Alps, the Min River cascades down a deep valley until it reaches the east edge of the mountains, when it turns southward along their flank. At the debouchure of the Min from the high mountains there lies a very remarkable plain, which might well have taken its name from the river, but which in reality took it from the capital of the province, Chengtu. Geographic names do not always follow the law of cause and effect; the river made the plain, and the plain made the city, but the city gave it the name.

The greatest dimension of the plain, some 70 miles, lies along the mountain front, while it stretches away from the mountains perhaps 40 miles southeastward. From its southeastern border this unique plain rises gradually but steadily toward the mountains or, more specifically, toward the mountainous gateway from which the Min River debouches at

Photo by Rollin T. Chamberlin

A BAMBOO SUSPENSION BRIDGE IN THE SZECHUAN ALPS

Kuan Hsien. As one coming from the southeast approaches the head of the plain at this debouchure, he finds himself stepping up at intervals from lower to higher broad platforms, or plain-like terraces, over the edges of which the rapid streamlets of the wonderful system of irrigation tumble in miniature falls.

These low terraces and the general slope of the area give the key to the mode of formation of the entire plain. It is clear that it is one immense flattened alluvial fan, spread from the debouchure of the Min over all the lower tract between the Szechuan Alps on the west and the buttes and sub-mountains to the east, burying the minor undulations under its great volume of alluvium.

Springing among the lofty peaks of the Szechuan Alps, the Min River rushes down its montane trough to its portal through the "Azure Wall," the last mountain rampart at Kuan Hsien. Once out of the mountains its wild plunging is checked, its carrying power is reduced, and in its less turbulent journey beyond it throws down, as a burden no longer bearable, its boulders, cobbles, gravels, sands, and silts, the abrasive tools with which it has been cutting deeper its trough through the rough country.

Thus in the course of recent geologic times it built up the great sloping plain, and laid the foundation for one of the loveliest garden spots on earth.

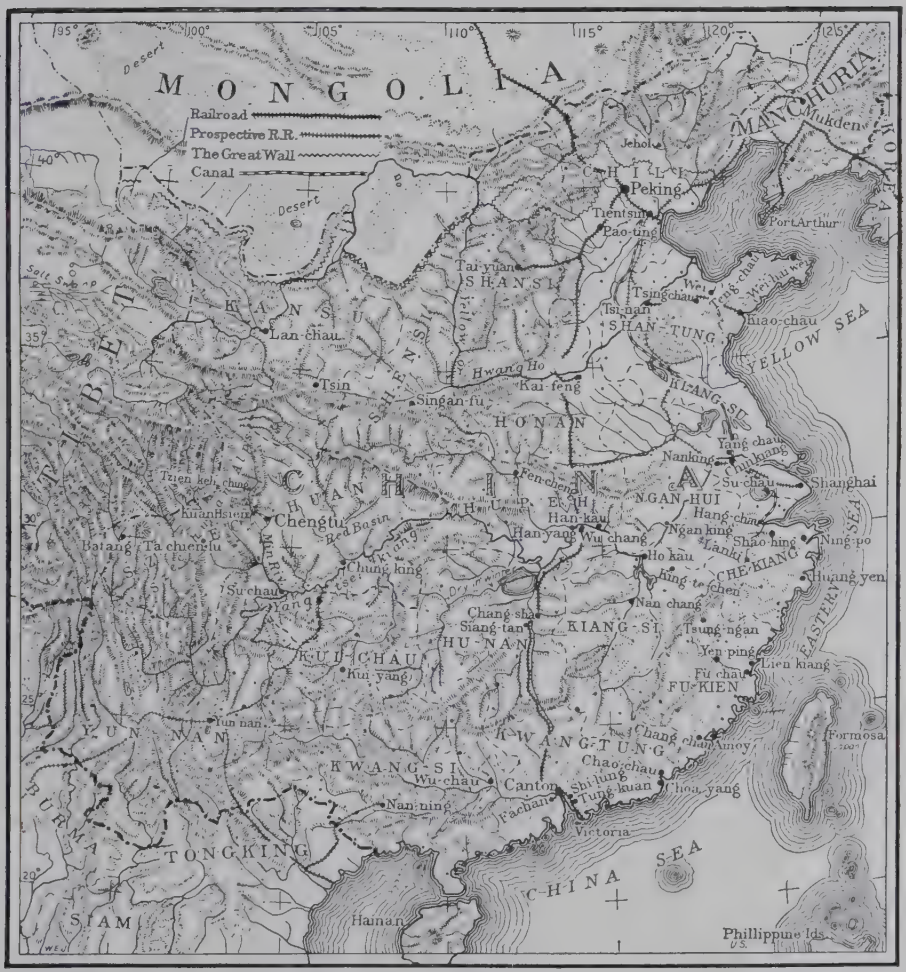
### INTRICATE IRRIGATING TRENCHES DEVISED 2,100 YEARS AGO

Favored with a naturally rich alluvial soil, this plain must centuries ago, even in its primitive state, have presented rare attractions to the Chinese immigrants from Shansi. But since its early settling the genius of the Chinese has vastly bettered its condition and increased its productiveness. The fundamental improve-

Photo by Rollin T. Chamberlin

THE CONTROLLING WORKS OF THE INGENIOUS IRRIGATING SYSTEM WHICH WATERS THE CHENGTU PLAIN (SEE PAGE 1097)

On the left is the Min River; on the right the main irrigation stream. This work, one of the wonders of the world, was accomplished by Li Ping, an engineer who lived 2,100 years ago. The fine grove of trees on the hillside above the irrigation stream surrounds the magnificent temple which is dedicated to this able engineer. Several of its pavilions may be seen in the picture.




OUTLINE MAP OF CHINA, SHOWING SZECHUAN

ment lay chiefly in devising an exceedingly intricate plexus of irrigation trenches, which spread the waters of the Min River far and wide over the plain. The system was admirably designed and skilfully executed. Though the natural difficulties were not a few nor slight, even from the viewpoint of an engineer of the present day, the work was successfully accomplished by Li Ping, a Chinese engineer who lived 2,100 years ago.

The controlling works at Kuan Hsien are the key to the whole irrigating system. Here a movable and adaptable dam or jetty, consisting primarily of boulders ingeniously wrapped in bamboo strips, so as to form long cylindrical wicker baskets, is so placed, when the time comes for turning the water into the trenches, as to deflect about half of the Min River into the head of the irrigation system. After flowing a short distance, this main irrigation stream is divided into two branches, each of which is later subdivided, and so on until each field throughout the plain is reached by the

Photo by Rollin T. Chamberlin

GRAVES ABOUND EVERYWHERE IN CHINA: MOST OF THEM ARE CIRCULAR, OR CONICAL, MOUNDS OF EARTH: ONLY A FEW HAVE TOMBSTONES

Photo by Rollin T. Chamberlin

THE VEGETABLE GROWTH ON THE CHENGTU PLAIN IS EXTREMELY LUXURIANT

As it is one of the most productive, so the Chengtu plain is one of the most densely populated tracts on the face of the globe. Save the ground occupied by the graves, no land is allowed to go to waste. The farms are crowded in so densely and are so assiduously worked that the fields look more like garden plots than open country farms (see page 1102).

water. From April till November, during the season of floods from the mountains, the water is directed into these trenches.

Without such an adaptable system to take care of the great increase of water in the summer season, the stream would frequently shift its course and carry devastation with it. To realize the protective value of this work, one has only to compare with it the unharnessed Hwang Ho, whose tragic appellation, "China's Sorrow," fittingly expresses the great disasters which have attended its wild migrations across the eastern plain of China.

Li Ping, who originally devised this irrigation project, did not live to see its completion, but his plans were carried out and extended by his son. In honor of these two able hydraulic engineers, whose well-directed labors have brought untold blessings to the many millions of people dependent upon the produce of the Chengtu plain since their day, there has been erected just outside the walls of Kuan Hsien a beautiful temple, facing the scene of Li's great triumph. Its base, with singular propriety, rests close to the water's edge, just opposite the long jetty which taps the main stream. Thence, in a succession of pavilions, or separate temples, the terraced structure reaches tier above tier high up the mountain slope (see page 1096).

These pavilions are built and decorated in the highest style of Chinese art, and, what is unusual if not quite remarkable in China, the edifice and everything connected with it are kept in an excellent state of repair. The total effect of the assembled pavilions stretching up the moun-

Photo by Rollin T. Chamberlin

CHENGTU WATERWORKS

The buckets on the wheel dip up water from the stream, and later, when near the highest point of a revolution, pour it into a trough, from which a pipe conveys it to the reservoir. The wheel is turned by the force of the stream.

THE RICE FIELDS ARE ALWAYS PLOWED WITH THE HELP OF THE WATER BUFFALO: THE PLOW IS OF PRIMITIVE DESIGN AND OF WOOD

Photo by Rollin T. Chamberlin

WHEELING THE PRODUCE OF THE FIELDS INTO CHENGTU

"We passed an almost continuous procession of half-naked, perspiring men, pushing sacks of grain on wheelbarrows toward Chengtu. Other wheelbarrows were loaded with large cakes of coke from the mines and coke-ovens along the Min River, near Kuan Hsien" (p. 1109).

tain side is truly impressive, and sets forth in a vivid way the almost worshipful reverence which the Chinese entertain for those whose labors have conferred lasting benefits on the community. We remember no finer temple in all China.

### ONE OF THE MOST PRODUCTIVE REGIONS IN THE WORLD

With rich soil, thus splendidly watered, and a mild climate, the Chengtu plain is made to yield as many as three or even, by special handling, four or five crops a year Rice is the staple summer crop and is, of course, grown in flooded fields. It is preceded by the poppy and the rape flower, which thrive in March and April, and followed in the fall by wheat, maize, barley, and buckwheat. Peas and beans are grown at various seasons of the year and are often planted between the rows or hills of other crops, especially wheat. This is partly to economize space, but also because the Chinaman fully appreciates what a benefit the cereal derives from the legume. In those fields where beans were grown amid the wheat, the latter almost always appeared much thriftier than in the fields where it was grown alone.

When a Chinese farmer was asked why he planted the beans in with the wheat he responded, "Because it improves the crops." Upon inquiring as to which crop, beans or wheat, was improved by the combination, his answer was, "Both." It may be that the Chinese farmer was right, and that the legume derives specific benefit from the cereal, as well as the cereal from the legume, for the Chinese have been experimenting for many centuries, being keen observers.

Photo by Rollin T. Chamberlin

NATIVE MODE OF TRAVEL: NOTE THE IRRIGATING CANAL FROM THE MIN RIVER

Cotton, sugar-cane, tobacco, madder, oranges, and persimmons are also raised. But the favorite crop during our visit in March and April was clearly the rape, or yellow mustard. It is raised in vast quantities for the oil which it yields. In early April, when the rape is in full bloom, its brilliant yellow flowers, growing on all sides in the greatest profusion as far as the eye can see, give the impression of soil culture developed to its maximum. The only land which is not pushed to the limit of high culture is that occupied by graves. As everywhere else in China, the graves cover very considerable areas.

Fields of poppy are now only to be seen here and there in those districts where the magistrates are somewhat lax in enforcing the laws. Since the use of opium and the growth of the poppy were prohibited by imperial edict, the poppy has nearly disappeared from the Chinese landscape. Only a few years ago it is said to have been very extensively cultivated, but now China is making a determined effort to rid herself of the opium curse.

### PEOPLE ABOUND EVERYWHERE

As it is one of the most productive, so the Chengtu plain is one of the most densely populated tracts on the face of the globe. Save the ground occupied by the graves, no land is allowed to go to waste. The farms are crowded in so densely and are so assiduously worked that the fields look more like garden plots than open country farms. Because of the luxuriance of the crops, land is said to be worth approximately twice as much as in most other parts of agricultural Szechuan.

People abound everywhere; they are

Photo by Rollin T. Chamberlin

A STREET SCENE IN CHENGTU: THE GROOVES IN THE PAVEMENT WERE WORN BY THE WHEELBARROWS

scattered over the fields; they move in steady processions along the main roads; they swarm in the numerous villages. The people in the fields labor long and hard, but their lot looks easier than that of the coolies on the roadways, who toil along all day under heavy loads, or push heavily laden, squeaky wheelbarrows on dusty highways. The Chinese wheelbarrow is the local transportation specialty for passenger and freight alike. It is not the lower classes of Chinese who are pushed along these dusty roads in the squeaky wheelbarrows. The lower classes walk. It is the leading citizen and the bespectacled scholar who travels in this noisy, dusty, and undignified style.

The freight traffic on the roadways leading into Chengtu is heavy. Produce from the various farm districts is wheeled into the capital by perspiring coolies. Other coolies carry their burdens in baskets suspended from the ends of a flat pole balanced upon the shoulder. The latter method is almost universal in south and central China. Equipped in this way, a coolie will walk all day long under a load of 40 pounds in each of his two baskets and cover 25 or 30 miles of mountainous road without apparent fatigue. On a journey he will keep this up for several weeks at a stretch. Though generally not large of frame, these men are marvels of physical endurance.

### CHENGTU IS ONE OF THE FINEST OF CHINA'S CITIES

Chengtu, the metropolis of this plain and likewise the capital of the province, is, with the possible exception of Peking, perhaps the finest city of China. At one time it was one of the three capitals of the Empire. And it is now the seat of a viceroy, for Szechuan, on account of its size and importance, has a viceroy all to itself. Chihli, in which the two great cities of Peking and Tientsin are located, is the only other single province so favored.

The city itself, inclosed by a massive

THE GREAT EAST STREET IN CHENGTU

Photo by Rollin T. Chamberlin

Silk stores are very conspicuous along this street, for Chengtu is a noted silk center The three parallel grooves in the middle of the street are the tracks used for the wheelbarrows. The present revolution in China began at Chengtu. (See article by Frederick McCormick in this number.)

Photo by Rollin T. Chamberlin

A GATEWAY TO A TEMPLE: CHENGTU

wall 9 miles in circumference, consists in reality of two distinct cities of widely different aspect. They are the Chinese city and the Manchu or Tartar quarter. A high wall separates them. From one end of China to the other there are no greater contrasts in architecture, in the appearance of the streets, or in the general plan of cities than are displayed on opposite sides of this Chengtu wall. Szechuan styles, characteristic of west and south China, prevail on the sunny side, while the Tartar inhabitants of the northern half of the city have patterned everything after their native Manchuria.

Toward the middle of the seventeenth century the Manchus from the north invaded China and, overthrowing the Ming dynasty, established their leader, Shun Chih, upon the dragon throne at Peking in 1644. Since then China has been ruled by Manchu emperors, and its people have worn the queue in token of their subjugation. The invading Tartars, after massacring many of the unfortunate Szechuanese, were so captivated by the natural charm of the region that they settled down as a foreign garrison. It is the descendants of these original invaders who inhabit today the Manchu city of Chengtu. They are pensioners of the nation.

The Chinese quarter of Chengtu, like most cities in China south of the Hwang Ho, is very compactly built. The houses and shops are set in close and the streets are narrow. Viewed from a height, such as the tall tower of the American Methodist hospital, the city presents an almost continuous mass of tile roofs, interrupted here and there only by foliage.

The streets are so narrow and are spaced so far apart that they almost escape detection in the general view. Though so narrow from the Occidental standpoint, these streets of Chengtu are,

Photo by Rollin T. Chamberlin

A BASEBALL GAME ON THE NEW CAMPUS OF THE WEST CHINA UNIVERSITY

It is located just outside the walls of Chengtu. Coached by some of the missionaries, the Szechuanese students have become quite proficient in the American national game (see page 1107).

nevertheless, notably wider than those of Canton, or native Shanghai, and far more attractive. The principal avenues of traffic are all paved with slabs of stone, and, what is quite unusual in Chinese cities, they are now kept remarkably clean under the orders of an efficient chief of police.

Marco Polo saw a Chengtu well laid out and paved just like the present city. A stone bridge across a tiny creek in the heart of the city stands today just as he described it back in the reign of Kublai Khan.

But the clean streets appear to be a recent innovation due to the enterprise of a young Chinese named Chow, who was till recently chief of police, but who has since become head of the industrial department. While chief of police he reorganized that department, put in operation a system of street cleaning, a system of street lighting, and took the beggars off the streets, putting the adults to work and sending the children to a school which he organized for the purpose. The result is, for China, a remarkably clean and attractive city.

Parallel grooves in the middle of the streets quickly catch the traveler's eye. These ruts have been slowly worn in the stone pavements by the wheelbarrows, which here do service in place of the street cars, carriages, and wagons of European and American cities.

The streets are lined on either side with shops and blank walls, broken by occasional entrances. The shops have open fronts and display counters fronting right on the street, so that the stock in trade may be viewed by passers-by and bargaining done without leaving the street.

But back from the street, whether it is

Photo by Rollin T. Chamberlin

ROADWAY ARCHES

lined with shops or a blank wall, lie mazes of courts one after another, bordered by rooms opening out upon them. It is to give space for this system of ramifying interior courts that the main streets are placed so far apart. The charm of a Chinese city is thus not in its exterior, not in the face it sets to the street, the public, or the stranger, but in the inner courts, the recesses of its dwelling places. Chinese civilization centers on the family.

### THE NEW UNIVERSITY

But the attractions of Chengtu are not wholly physical. Its new intellectual attitude is one of its most inviting features. It has reason to be proud of a new university, shaped on modern lines and rapidly growing into place and influence under the patronage of the government. To this is added a second university, now building under the generous coöperation of five missionary bodies, and taking shape, under western religious and scientific direction, on broad and liberal lines The generous spirit and genial relations of these Chinese and Christian educational endeavors is a model for other lands, and though there is as yet but a beginning of the higher and better education, it promises to be the beginning of great as well as good things.

### A TRIP INTO THE SZECHUAN ALPS

Time in Chengtu was precious to us for educational inquiries, but the call of the nearby Szechuan Alps was too strong to be put aside by geologists, and so a morning of early April found us traversing the Manchu city and leaving Chengtu by the west gate. We were late in starting, due to the inevitable delay in bringing together the coolies to carry the chairs and baggage, adjusting the porter loads, and arranging and starting the caravan.

Furthermore, when just outside the

Photos by Rollin T. Chamberlin

CHENGTU SEWAGE SYSTEM

ONE OF THE FEW POPPY FIELDS REMAINING IN THIS PORTION OF SZECHUAN: THE FLOWERS ARE EITHER PINK OR WHITE

Photo by Rollin T. Chamberlin

AN ENTRANCE TO A VILLAGE

city gate, the coolies laid down the chairs and demanded one-third of their day's wages. Warned that this would happen, a few pounds of copper cash were ready for them, but to apportion this among fourteen coolies, with much talk and argumentation, consumed valuable time. The coolies also found it necessary to eat a bowl of rice apiece to fortify themselves against the hard day's work ahead. All this added to the delay, and it was freely predicted that we would never cover the 35 miles to Kuan Hsien before the gates of that city closed for the night.

But the initial troubles of transportation rapidly faded before the amazing beauty of the Chengtu plain. I think I have nowhere witnessed a moving scene more consistently charming, more sustained in its fascination, or firmer in its hold on the mind's fancy than the succession of vistas of rural Szechuan as they greeted us in succession on this perfect April day. Vast quantities of rape were in bloom, giving a mosaic of a bright yellow and green to the landscape. Though only early April, the air was balmy and genial. It was even a trifle too warm to please the hard-working coolies on the road.

We passed an almost continuous procession of half naked, perspiring men, pushing sacks of grain on wheelbarrows toward Chengtu. Other wheelbarrows were loaded with large cakes of coke from the mines and coke ovens along the Min River, near Kuan Hsien. Other wheeled loads and occasional fine ponies and, rarer still for central China, nice cattle gave variety to the highway procession. The extent of this road traffic implied great industrial activity on the part of the people of this portion of China.

All day long we hurried over the well-traveled road, upon what appeared to the eye to be a nearly level plain. In reality it steadily rose in altitude, if the barometer spoke truly, as it surely did; indeed the aneroid indicated a rise of 700 feet between Chengtu and Kuan Hsien. At

Photo by Rollin T. Chamberlin

A GROUP OF GIRLS WHO WERE PICKING FLOWERS UNTIL FRIGHTENED BY OUR KODAK

Photo by Rollin T. Chamberlin

ALL BAGGAGE GOES BY COOLIE: THIS ONE IS CARRYING THREE HEAVY AMERICAN SUIT-CASES, AND SOME SMALLER TRAPS IN ADDITION

Equipped in this way, a coolie will walk all day long under a load of 40 pounds in each of his two baskets and cover 25 or 30 miles of mountainous road without apparent fatigue. On a journey he will keep this up for several weeks at a stretch. Though generally not large of frame, these men are marvels of physical endurance (see page 1103).

Photo by Rollin T. Chamberlin

ANOTHER METHOD OF CARRYING A LOAD AMONG THE SZECHUAN ALPS

many points there was a great deal of gravel exposed in the irrigation ditches, hinting at swift currents. And after passing Pi Hsien, our lunch point, we often saw piles of large water-worn stones in the fields. In the middle of the afternoon the gradient of the sloping plain increased noticeably, so that we became conscious of rising. The irrigation streams descended many short falls at points where there had been slight terracing.

We pushed on as fast as we could go throughout the afternoon. At length there slowly took form out of the twilight haze the rugged outline of the Azure Wall, the mountain front. Szechuan's famous veil of blue haze had hidden the mountains till we were almost among them, so that our goal was never in view. We had already begun to feel some apprehensions for our night's lodging, for in Chengtu the city gates close promptly at dusk, and we had been led to believe that such was also the custom at Kuan Hsien.

If the traveler, native or foreign, is so unfortunate as to be unable to reach the gate before it is formally closed he must pass the night outside the walls. At sundown we were still many li from Kuan Hsien, and so Mr. Wang, the Chinese student traveling with us, hastened on ahead in our lightest mountain chair, with intent to make special plea of the gate-keeper and secure our entry into the city. Reaching the south gate of Kuan Hsien, in total darkness, at 7.45 p. m., he found the portal wide open and our fears quite vain. As the remainder of the caravan straggled in we learned, too late to get any comfort out of it, that the gates of this city did not close until 10 o'clock.

Photo by Rollin T. Chamberlin

CHENGTU RAPID TRANSIT: MR. WANG (OUR INTERPRETER) ESSAYS THE WHEELBARROW ON A JOURNEY INTO THE SZECHUAN ALPS

Photo by Rollin T. Chamberlin

A LIGHT CHAIR SPECIALLY CONSTRUCTED FOR TRAVEL IN THE MOUNTAINS

Travel in it was speedier than in the ordinary sedan, but it was not comfortable for more than an hour at a stretch

### A CHINESE TOWN

The Chinese inn at Kuan Hsien ranked among the better class of Szechuanese inns. Its provisions and accommodations were in no essential way different from or more extensive than those of other inns of its class. Its principal features were the walls, the roof, the floor, a few chairs and benches, and a small dining-table. The traveler in this country always takes with him his own provisions, a cook to prepare his meals, and his own bedding for the night. The inn simply provides a place where he may camp; for, on account of the extreme degree to which all available land is cultivated, there is not room outdoors on which a traveler may camp.

The hard journey of the first day, or its suggestion of too strenuous travelers, proved unpalatable to about half of our chairmen and carriers, and they gave up their tasks and returned to Chengtu. On account of the general prosperity of this region, together with an apparent abundance of work to keep the inhabitants employed, our fu-to, or head coolie, found it difficult to engage men to replace the deserters, and it was 8.45 a. m. before we were able to leave the inn. Such a scarcity of unemployed men here impressed us all the more forcibly when we recalled how frequently local coolies had bid low, and even scrapped, for the chance to relieve our chairmen on the overland journey from Wan Hsien to Chengtu, across eastern Szechuan. This seemed a fact of some significance as an index to the economic conditions and the relative prosperity of these districts.

A SERRATE PEAK OF THE FRONT RANGE OF THE SZECHUAN ALPS

Photo by Rollin T. Chamberlin

The yellow rape, or yellow mustard, seen in the foreground, thrives even in the mountainous region. The rape is raised in vast quantities for the oil which it yields. "At length there slowly took form out of the twilight haze the rugged outline of the Azure Wall, the mountain front" (see page 1111).

Photo by Rollin T. Chamberlin

A WOMAN SMOKING A PIPE IN A VILLAGE NEAR PI HSIEN: NOTE THE WHEELBARROW

Kuan Hsien is located at the immediate foot of the front range, which the imaginative natives have styled the Azure Wall. One begins hill climbing even before passing out of the city gate on the Alpine side. The city wall runs along a steep hogback ridge, which extends from the mountain side to the river's edge, where it has been cut off sharply in a nearly vertical cliff. This ridge is due to the resistance of a hard reddish conglomerate, which stands at a high angle and marks the border of the mountain folds. The strata, which beneath the Chengtu plain lie essentially horizontal, are suddenly and sharply upturned at Kuan Hsien, and give rise to the front ranges of tilted sedimentary rocks, behind which rise the loftier granite peaks that form the heart of the Szechuan Alps.

We passed over the frontal ridge and followed the east bank of the Min to the magnificent temple, commemorating the two engineers Li, which I have already mentioned. Close by the temple, we crossed the river on a suspension bridge of a pattern common enough in the mountains of China, but unique to an American. It consisted of a swaying boardwalk, supported by heavy bamboo ropes suspended on stone towers. Four loops were required to span the broad Min. Just above the bridge is the dam of wicketed bowlders, annually renewed, which controls the system of irrigation for the plain of Chengtu (see p. 1096).

Continuing upstream, on the west bank of the river, we found the strata all standing nearly vertically, with the Min crossing the hard resistant formations near Kuan Hsien nearly normal to their strike and flowing southeastward, as it does also on the plains beyond. But after a couple of miles of resistant beds a much softer formation follows in the

Photo by Rollin T. Chamberlin

OPEN-AIR THEATER AT HSING CHANG, NEAR KUAN HSIEN

The actors are doing their best to hold the attention of the audience, but the audience is vastly more interested in the American photographer, who slipped up quietly with the hope of getting a picture of the performers on the stage.

stratigraphic succession. This sharp change in the formation is rendered conspicuous by a right-angled bend in the river. For perhaps five miles above the river flows along the strike of the soft layer in a northeasterly direction because of its easy erosion, but on encountering the hard frontal strata it turns sharply across them.

Our purpose being to penetrate into the mountains as far as possible in the brief time available to see what we could of the structure of the ranges, the journey along the strike was far from welcome; but we could only follow the river, for the back country is extremely rugged and can be traversed only with much difficulty. Close to the river bend the tunnels of three coal mines penetrate the canyon wall. The average thickness of the coal seam in the three mines is said to be only about a foot and a half. Just beyond the river bend are large lime kilns. The natives were also seen to be washing the river sands for gold.

Beyond the great bend in the river we followed a winding hillside path, now high above the rushing stream, now down near the water for most of the afternoon. The river was found to follow the strike rather closely, shifting from one set of weak layers to others as advantage offered. The left mountain wall is formed of a great rock face of gray metamorphosed limestone standing in steep beds, which are even overturned so as to dip toward the northwest. Specimens of the genus Productus, found in

Photo by Rollin T. Chamberlin

At every village through which a foreign caravan passes the natives swarm about the sedan chairs to catch glimpses of the curious passengers. They are generally highly amused and very seldom show any signs of animosity toward the stranger.

fragments of this limestone on the right bank, place its age as Carboniferous. Probably this great limestone formation is to be correlated with the thick Wushan limestone of the Yang-tse gorges, which has been described by Willis and Blackwelder.

Late in the afternoon at Tzien Keh Ching a parting of the ways was reached The Min River at this point makes another right-angled turn, and from Tzien Keh back to its source high up in the heart of the Alpine tract the stream maintains a course generally at right angles to the strike of the strata, and thus takes the traveler straight across the structural features of the region.

The rough mountain road, which was leading us southwest along the strike valley, may be followed right on up the valley, which is occupied by a tributary of the Min. This is the route to Ta Lu, Batang, and eventually Lhassa.* Though this road finally leads across the mountain barriers to the great plateau, one day's dash along the strike did not appear promising from our point of view. We preferred to trust to the narrow pathway which follows the main stream above Tzien Keh, in the hope of getting in the short time available the key to the geologic structure of this part of Tibet's eastern mountain border.

Tzien Keh Ching is a typical mountain

*This region is admirably described in the November, 1911, number of the National Geographic Magazine by E. H. Wilson, who traveled from Kuan Hsien to Ta Chien Lu.

village. One principal narrow street parallel to the river and lined solidly with shops constitutes the main portion of the village. A swaying bamboo suspension bridge connects the cluster of habitations on the terrace across the river.

Standing forth prominently on the river bank opposite, in the angle between the Min and its tributary, is a picturesque nine-storied pagoda. This is a common sight, for no town of any importance in China would feel secure unless overlooked by at least one of these odd-storied pagodas to ensure it favorable winds and weather. The pagodas that guard the welfare of river towns, as in the present case, are commonly perched upon the most conspicuous point of the opposite bluff, or of the bluffs above or below the town, that they may the better work their beneficent results on the spirits of the air.

To facilitate the next day's dash into the mountains, all of our baggage and the heavy fourman chair were left behind with our servants. Taking only the remaining pair of two-man sedan chairs and eight chair-carriers for relays, our party of three pushed up the valley almost due north across the trend of the mountain structure.

A path amid a wild gorge led us through the great mass of Carboniferous limestone into the more open portion of the valley above, where the older Paleozoic formations of less resistant character have retreated somewhat into mountain slopes before the steady wear of the elements. In this wider portion of the valley a thick mantle of loose rock and vegetal covering obscures the solid rock, which comes to light on the lower slopes only here and there. Wherever the strata could be inspected in place on this hurried trip, the bedding planes, often with ripple-marks, were found to stand nearly vertically or to be slightly overturned. The direction of strike ranged from N. 65° to 70° E.

The persistence of these vertical or very highly dipping beds is quite extraordinary. For mile after mile, as we crossed the axes of folding, their attitude continued unchanged. Finally we came suddenly upon granite which had every appearance of being basal to the series rather than intrusive in it. The valley then narrowed sharply and the country beyond became wild and mountainous.

Three miles onward into the granitic region over a rough trail was the limit of the party's advance. In this distance no very notable change in the character of this basal granitic mass was observed. A scramble of 2,000 feet up the slopes of a prominent peak afforded a general, though not very distant, view of the mountains. The sky, unfortunately, was overcast and the great peaks were enshrouded in the mists. In addition that peculiar but singularly persistent haze which hangs over Szechuan conspired with the clouds to curtail anything like an extensive, sharp-cut panorama.

In the direction from which we had come, the Front Range, those giant hogbacks of nearly vertical, red Permo-Mesozoic grits and conglomerates, was still plainly visible. This hogback ridge rises beyond Tzien Keh in a fine serrate peak to an altitude of about 7,000 feet, or 4,500 feet above the Chengtu plain. The peaks of older Paleozoic rocks in the middle distance were generally less lofty, but, on account of their vertical bedding, they give rise to a rugged topography. But with the insetting of the granite the mountains rapidly increase in magnitude; they give the impression of taking on lines of a larger order.

Viewed toward the northwest, each peak beyond seemed to rise higher than the one in front of it until obscured in the clouds, leaving the rest to be imagined. Mountains which should reach 12,000 feet were seen, and at a distance of some 30 miles further on there are said to be snow-clad peaks towering well over 20,000 feet above the sea.

Structurally the first ranges of the Szechuan Alps which buttress Tibet on the east are the carved remnants of the outer limb of one stupendous anticlinal fold. The other limb must be far away and may not exist, for the structure may consist of a monoclinal flexure. No evi-

Photo from China Inland Mission, Toronto

A GROUP OF CHINESE WOMEN AT SHIH-MEN KAN, YUNNAN, CHINA

Married women who have borne children have their hair done up on top of the head in the shape of a horn

dence of any extensive faulting was noted.

The series of sedimentary formations is very thick. We estimated that between the Triassic red beds, which have been sharply bent upward out of the Chengtu plain, and the basal granite in the mountains, we could scarcely have crossed less than 8 miles of vertically standing sedimentary beds. This would seem to imply a thickness in the neighborhood of 40,000 feet for this part of the stratigraphic column, if there be no unrecognized duplication.

More could not be seen in the scant time at our disposal. We hurried back to Tzien Keh Ching over the winding pathway. Several times it was necessary to cross over the rushing waters of the Min on swaying bamboo suspension bridges, which added to the picturesqueness of travel. Interesting sights and incidents enlivened the way, but our chief need was to get back to educational work at Chengtu as quickly as possible, and we bent our efforts to that end. Two days later we reëntered the beautiful capital of Szechuan.

# PRESENT CONDITIONS IN CHINA*

By Frederic McCormick

CHINA is the most interesting and at the same time the most exasperating subject. No two authorities of our time agree about it. Among them a China discussion is a fine chorus of contradiction.

The land of the great wall, ancient porcelain, the pigtail, gunpowder, printing, jade, embroidery; "Kitai," or Cathay, the land of literature and art, the flowery realm of tea and silk, home of the mariner's compass, the Celestial, or, more graphic, Middle Kingdom—this is the playground of rebellion, contagion, famine, violence, death, change, and every event of universal revolution.

Hitherto, war to this realm meant the rebellion of the outer barbarian, as the Han, or Chinese, called his foreign enemies. That is no more. The center has rebelled; China has war within. Such a land in civil strife is, indeed, the land of gunpowder.

China is as large as the United States, lies in the same latitudes, has similar physical characteristics, and the same kind of climate. It looks the same to the traveler until he comes to a walled city, with its pagodas, or meets several people. And several are always to be met with, because there are perhaps 275 million of them altogether.

## POPULAR MISCONCEPTIONS ABOUT CHINA

China is populated with human beings. The great head of them (in foreign minds), the late Empress Dowager, called them "my black-haired people." I have lived intimately with them, and for some time was a member of a distinguished Chinese family in Peking. I never ate any rat, nor any cat, nor any dog, to the best of my knowledge and belief. I went frequently, as a dinner guest, to a fine Chinese friend, who always told me, when we sat down at the table (quietly, on the side), that on his last visit to my house he had caught a perfectly bully stray dog in my street, and had saved it up especially for me. His cook, he said, who was a noted one in the neighborhood, had done his best, and the dog would be along in a few minutes.

But I must say that during some years of campaigning in China, such as when the Court was driven out of Peking, when we took the country people by surprise and they did not have time to prepare food for us, we ate such things as we found, and about which I never cared to inquire. And in fact, always, ever after, when this subject comes up, I think right up to that point and stop.

Chinese are honest, like other folks. I always find it necessary to say this, because in a census which I have taken I find it the only subject respecting China of positively universal concern. The question is always asked, and the Chinese and Japanese compared. To the cosmopolitan and to the correspondent it is like asking if the people of L street are more honest than those of M street. Inwardly we know that the question of honesty is the same the world over, and comparisons are impossible.

The Chinese do not all live on rice nor chop suey. More people live on chop suey in New York than in all the Chinese cities I have visited. Chop is English for trade-mark, or sign, and suey means water. I am told that the chop suey is the diagram at the loading line of a ship, and is the invention and peculiar property of Lloyd's, of Great Britain. Such is the identity of this great common heritage which, along with kerosene, cigarettes, flour and religion, and the open door, unites China and America.

The Chinese do not all wear queues, and did not before the cutting of the queue was sanctioned a few years ago. They are not all even of the same

* An address to the National Geographic Society, November 17, 1911.

race, customs, and appearance. Probably one-fifth have angle eyes, such as are frequently found in Anglo-Saxons.

MANCHUS ARE MORE PROGRESSIVE THAN THE CHINESE
(SEE ALSO P. 1135)

They do not all hate the Manchus, who are said to rule them. They rule themselves, and only a few of them ever saw a Manchu or could recognize one. China is what she is because she is Chinese. Reformers have sometimes tried to evade this truth, and in times of rebellious recrimination have shouted it out loud—just as loud as they could.

For several weeks "Down with the Manchus" has been a war-cry in China. It was the war-cry of the Taiping rebellion, and of countless rebellions since, as well as countless rebellions previous—right back to 1644, when the Manchus took the Chinese throne from their Chinese allies. There are no new war-cries in China. The only new cry is the cry of the Western idea in the progressive Chinese, the foreign idea of knowledge and of human life upon this earth and in the hereafter. The same ideas are older in China than in the earth outside China, but the outside has succeeded in impressing a different form of the ideas upon Chinese.

Photo from China Inland Mission, Toronto

MARRIED WOMEN OF YUNNAN (SEE P. 1119)

The Manchus, who hold the throne, have not been caught unawares by revolution. They have given more thought than have others to its meaning and possibilities, dreading the present moment from the days of the Boxer War, when their late Empress Dowager discovered that the progressive Chinese and Manchus were aware of her grave political faults. From that time of the Boxer War until 1908, when she died, she issued, enforced, relaxed, and re-enforced special mandates against the leaders of reform with inexplicable whim, caprice, and bloodshed. She laid hands on the first martyr of this revolution when Shen Chin, the reformer, with great cruelty was beaten to death with a stave in the imperial prison of Peking, July 31, 1903. Believing that he was being sacrificed for making known Russian demands that became one of the causes of the Russo-Japanese War, and appreciating his fate, he indited, some hours before his torture, a poem in which he spoke uncomplainingly of his betrayers, addressed the spirits of 11 other reformers of his native provinces who preceded him as martyrs of the Palace Revolution of 1898, and appealed to the noble to remember his sorrows. This is the poem:

Photo by H. S. Elliott

PRESSING COTTON CLOTH IN SZECHUAN

This is the method of pressing the cloth after it has been dyed. The man puts his weight from one side to the other and the heavy stone-roller goes over the cloth.

With clanking chains I leave my prison pen
Alone, to die beside the Shun Chih men,
Where, in the market-place, their life's blood runs,
Five loyal and six learned Hukuang sons.
I too shall lie there with you. I have won
But little and my day is done.

Japan and Russia striving for the East,
China her second capital hath lost.
Partition comes apace, O bitter thought!
Rulers, look ye on the Allies' maps for nought?
My countrymen and foreign journalists!
O publish forth in the five continents
My buried wrongs!
The secret treaty I have dared to tell—
For this 'twas Ch'ing and Chung Lang used me ill.
The little reputation I have won,
How worthless! this year I am but thirty-one!
Henceforth come weal, come woe, I shall not heed,
Amidst the choirs of Heaven shall my spirit feed.*

ATTEMPTS TO ASSASSINATE THE EMPRESS DOWAGER

At the same time the Empress Dowager began devising a constitutional government for the Empire that she afterwards inaugurated, and that was a wise and sufficient scheme if carried out, and in fact was being systematically put into operation when revolution broke out. She is the first cause of the revolution to the reformers, and calls for more than a passing word.

There are two schools of reformers, and they are divided by the period of the Boxer War of 1900. The hatred which the Empress Dowager excited in the world by her massacres of foreigners at that time and among the reformers of China can be compared only with her magnitude as a sovereign. She was an autocratic luminary, like a planet, of enormous political dimensions. Foreigners and natives alike clamored for her life. A foreign correspondent of position and fame in the world was in the habit of proffering a reward of $1,000 to any one who would assassinate her. For the last 20 years of her life foreigners regarded her as China's greatest enemy, and professed to believe that her death would be China's greatest blessing. These ideas were mixed with other Western influences in China and had their effect on the Chinese.

A reformer, whom I knew well, came to me at a time and place which it would be indiscreet to identify, and told me he himself desired to kill the Empress Dowager, and that he had made preparations to do so. He was a young man of considerable attainments and experience and equipped for such an enterprise. It was a beautiful, calm day on which he called to make with me a final disposition of his affairs.

* By courtesy of the Metropolitan Magazine.

Photo by R. Powell, China Inland Mission, Toronto

THREE MANCHU WOMEN: NOTE THE CHINESE WOMAN BEHIND WITH SMALL FEET AND A STICK TO HELP HER ALONG

I asked him his plan, and he said he would kill the Empress Dowager single-handed, in the roadway, on one of her frequent journeys between the palaces, or between the palaces and the tombs of her ancestors. The Empress Dowager at the time was going about much, but always guarded.

I kept my friend in my house throughout the day and we talked the plan over. At the end of our talk he agreed that to kill the Empress Dowager would produce a situation for which neither the reformers nor the Manchu clan were prepared. There was no one to take her place; and the reformers, least of all, could form a government. And furthermore, when we had gone over the history of China's attitude to foreign nations, he was convinced that it was because of his own people, the Chinese, and not of the Manchus, that China was where and what she was.

Though the Empress Dowager had committed political faults as great as it was possible for one in her position to commit, it is true that the Chinese had had free access to the world at all points for centuries even before the Manchus, had been offered the bread of political life by disinterested foreigners of all countries, had gone abroad and brought nothing home, and until then had rejected all.

### THE CHINESE, NOT THE MANCHUS, RULE CHINA

The revolution was not a month old when the National Assembly at Peking, by utter contempt for the Manchu clan and court, showed that it was the Chinese and not the Manchus who had ruled China, and that if China was broken into pieces it would be by the Chinese. At the word of the Chinese race, spoken through a small number of assemblymen at Peking, the court vanished and the highest officials disappeared.

Dr. W. A. P. Martin, the most famous of living sinologues, aptly characterized

Photo by H. S. Elliott

PULLING A BOAT UP THE RAPIDS IN THE YANG-TSE GORGES

Photo by H. S. Elliott

BISHOP BASHFORD'S HOUSE-BOAT BEING SLOWLY DRAWN THROUGH A DIFFICULT PLACE BETWEEN A ROCK ISLAND AND THE SHORE

Photo from Rev. B. St. John

PLACE WHERE THE PEKING–TIENTSIN RAILWAY GOES THROUGH THE OUTER WALL OF THE HATA GATE: PEKING, NORTH CHINA

China as Chinese when he exclaimed: "China is not a power; China is an old ash-barrel, held together by the powers, and with a hen inside—goose if you will—sitting on golden eggs." As between the Chinese ash-barrel and the Manchu goose, there is some choice and it is not disadvantageous to the Manchus. China has had her reformers always. Kuang-hsi was the latest of them. The ruins and solitudes of the palace seem more in keeping with his life than the grandeur of the surroundings of the august aunt, his Empress Dowager. China's emperors have been the first reformers in connection with modern civilization, and at last the problem of civilization or reform for China has come back to them; and, owing to the great prosperity and increased power of the Chinese and the parsimonious, inhospitable, and corrupt treatment meted out by them to the throne, China has struck the Manchu dynasty at its unlucky hour, when weakest, when at the lowest ebb of its imperial vitality, relative race strength, wealth, and influence. The Manchu dynasty and the Manchu race has been in a position of being slowly strangled by the Chinese giant.

## CHINA IS A VAST DEMOCRACY

China is a vast democracy under nominal control or surveillance of a liberal despotism in the form of the Manchu imperial house, its liberality representing the wisdom of the Manchus in acquiescing in the self-governing disposition of the Chinese, and the despotism representing the ferocity that ages of civilization have not educated from the Asians in the Chinese Empire, the nearly total weight of whom is Chinese.

Seeing the coming of great changes through foreign ideas, the Manchus, in 1907, granted to the people provincial

assemblies with power to discuss but not yet legislate. This gave them a taste of power the effects of which the administrators of China, Chinese and Manchus alike, had long feared. The government installed a bureau in Peking to restrain these assemblies, which were soon out of control, not merely discussing but undertaking reforms.

The student class operated newspapers and brought all assemblies and students into touch. In Szechuan, the largest and wealthiest province of China, a large percentage of the members of the provincial assembly were students returned from Japan, and one of them, Pu Tien-chun, their leader, was president of the assembly. No other assembly was more free in its criticisms of the authorities.

It had a constitutional struggle with the viceroy and won. It espoused the causes and grievances of the Hunan and Hupeh provincial assemblies, the members of which executed the main revolt at Wuchang, and its leaders in these grievances, which were centered in the opposition to foreign loans for internal improvements, organized the Anti-Foreign Loan Society and brought about the first rebellious outbreak, that of September 6, 1911, at Chengtu, their vice-regal capital (see page 1131).

### THE MOST ANTI-FOREIGN PROVINCES

However, Hunan and Hupeh provinces, adjoining them on the east, and of which Wuchang is the vice-regal capital, furnish almost the whole history of the rise of the revolution. This is the industrial, commercial, and strategic center of China. The three sister cities of Wuchang, Hankow, and Hanyang represent the heart of the Empire. In 1908 an American university sent a costly mission around the world and to China to determine the future Chinese center of national interest, intellect, and power, with a view of establishing there a great Western university to save China from foreign and self-destruction. It was then determined that the three cities forming this center would be permanent—would remain on the map, so to speak, when the locations of other cities, marts, and the center of communications and populations would change through industrial regeneration. No calculations were then dreamed of that took into account such destruction of two or three cities as has taken place recently.

Hunan and Hupeh are the two provinces surrounding these cities and forming this center, and it was the reformers there and the troops of these provinces who, following the Szechuan outbreak, precipitated war against the existing rule of China.

It is believed that in these provinces three to four millions of people were in destitute condition at the time of the outbreak, due to flood and famine, and that over 100,000 persons had lost their lives. This desperation may account for a part of the determination of the inhabitants in their revolt; but from the first this center was rebellious. It had a previous reform history, which ended in bloodshed and defeat in 1898. Hunan was the first to ask for a constitution for China. On August 27, 1908, the throne sanctioned the general principles of a constitutional system, to commence at once and be in full operation in nine years; but this did not satisfy the Hunanese. They established a society for independent action in public affairs which was incorrigible, and from the Chinese standpoint unlawful. Rebellion thus found its first strong soil in Hunan.

Hunan had always had the name of being the most incorrigible and anti-foreign province of China, suspected of being concerned in revolutionary outbreaks, such as the destruction of a railway carriage by a bomb and wounding of several high officials at Peking in 1905 and the assassination of the governor of Anhui province in 1907. Yang Tu, a Hunanese, was then the leader of the younger or reform party, whose agitation among the Chinese students in Japan, where anarchy had already established itself, caused the so-called "strong man of China," Yuan Shin-k'ai, to offer him office in order to arrest his revolutionary work.

BLOODY DEMANDS FOR A PARLIAMENT

The first assemblies convened October 14, 1909, according to the constitutional plan, and Hunan, joined by Hupeh, sent a delegation to Peking to urge the throne to decree a parliament at once and not wait nine years.

To enhance the effect of the mission, a Hunanese school teacher chopped off one of his fingers and with the spurting blood from the stump wrote an inscription praying the already over-convinced delegates to demand parliament. This act was a good illustration of the extravagant spirit of the revolution, which soon declared for a republic.

Last year (1910) 17 provinces formed a similar mission to Peking, following which the National Assembly was opened there October 3; and, influenced by the tempestuous action of Hunan and Hupeh, from the first urged the government to abandon its own plan and grant an immediate legislative parliament. It defied the government; which, however, managed it with great calmness and success, avoiding the granting of any revolutionary demands until the outbreak of war. Through all this history-making the material decline of the Manchu dynasty is so precipitate that its details strike one with awe.

The reformers of Hunan and Hupeh opposed the government's policy of central ownership of railways and industrial development of China by the use of foreign money. They succeeded in holding up the famous "Hukuang" loan for the building of trunk-line railways in three directions out of Hankow, which in 1909-1910 was promoted by the four great capitalistic nations of Great Britain, France, Germany, and the United States.

The gentry of Hunan, who have always been the most powerful of the gentry class in China, became the head of this opposition, and showed by their course that rebellion, the seat of which was established in the provincial assemblies, was due not only to the leaven of foreign ideas, but to the ancient sense of provincial and community right.

No curb upon these reformers and revolutionaries was attempted until the government at Peking found it necessary radically to revise its internal policy and its finances and prepare for war and other emergencies.

NEGOTIATIONS FOR FOREIGN LOANS

Financiers of France and Great Britain were the first to sense the revolutionary rapids ahead of the Manchu government, and in 1907, when the country became revolutionary, adopted the principle of no loans to China for unproductive purposes (such as for the army or navy), and China learned by the sufferings attending her poverty at Peking that until she had a uniform currency she could not develop industries, increase national revenues, nor finance war.

On September 20, 1910, she asked America, somewhat suddenly, for a loan of $50,000,000 to reform her currency. We admitted the other three capitalistic world powers to the transaction, and the four together obliged China to close up the pending Hukuang loan agreement concurrently with the currency loan agreement, regardless of the opposition from Hunan, Hupeh, and Szechuan, whose reformers had gone so far as to influence mobs to make demonstrations of force against the employment of foreign money in railway building.

To carry this business through, China brought from Shanghai her strongest financial and industrial statesman, Sheng Hsuan-huai. This able and courageous official persuaded the government to tackle the Hunanese problem at once, and the issue of the two loans was approved by the throne in June, 1911, in spite of the reformers and revolutionaries there.

All now know what happened. The Manchu government and dynasty, in the language of the Chinese classics, was "riding the tiger." But they had been riding it for several years, and as their difficulties grew they began to regret the removal by them from office of the strong civil and military mandarin, Yuan Shih-k'ai, in 1909. This official had had

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MANCHU MEN

"The Chinese do not all hate the Manchus, who are said to rule them. They rule themselves, and only a few of them ever saw a Manchu or could recognize one. China is what she is because she is Chinese" (see pages 1121 and 1135).

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A MANCHU MAN AND WIFE

"China has struck the Manchu dynasty at its unlucky hour, when weakest, when at the lowest ebb of its imperial vitality, relative race strength, wealth, and influence. The Manchu dynasty and the Manchu race has been in a position of being slowly strangled by the Chinese giant" (see pages 1126 and 1135).

an important career, being for 15 years closely associated with Li Hung Chang, on whom the Manchus had relied in war for half a century, and was recognized as his legitimate successor. In 1898 he had become a powerful administrator and military organizer, and by 1907 had built up a defense army of foreign-trained battalions numbering nominally 80,000, and was rated the military master of the Empire.

At the end of 1909 the government was making every effort to calm the reformers and revolutionaries and get Yuan Shih-k'ai back to Peking. Yuan Shih-k'ai understood the dangers of the situation, but did not believe it was time to return. In 1910 the throne sent his protégé, Tong Shao-yi, well known in this country, where he was educated, to his home to request him to return. He named conditions, such as would guarantee his freedom from court interferences; but as these were not in the power of the regent to grant, he remained at home, about midway between Peking and the seat of the coming revolution.

When rebellion broke out the throne threw aside all indirectness and appointed him viceroy of Hunan and Hupeh, and imposed upon him the task of pacifying the revolutionary region. It was too late.

I mention this aspect of the revolution because it immediately concerns the diplomatic interest of the United States, for when Yuan Shih-k'ai was dismissed from office in January, 1909, this government believed, with that of Great Britain, that the dismissal endangered the peace of China and the welfare of foreign interests there. In consequence the two powers joined in representations to China, requiring on her part a reply as to China's policy under the new reign. The statement, I believe, was not considered satisfactory, and in fact the gradual weakening of the central power in Peking took place.

### THE BEGINNING OF THE REVOLUTION AT CHENGTU

The opening revolt of the revolution in China will ever be memorable, and I will give you the graphic account which has reached me from an eye-witness in Chengtu, Szechuan, where rebellion was organized by the Tong Chi, or Anti-Foreign Loan Society. When the moment for raising the standard of rebellion approached, the revolutionists printed reassurances to the people and sent speakers into the streets, who harangued them from positions of advantage. These speakers were heard to say, "Don't touch the foreigner or his property, or our cause is doomed."

In the forenoon of September 6, 1911, a student, under guise of being possessed of a demon, secured audience with the viceroy and told him he had witnessed the destruction of Chengtu in a dream, at the same time handing him a copy of the book of preparations of the revolutionists. September 7 the viceroy called up the leaders of the Anti-Foreign Loan Society by telephone, told them he had an important communication from the Emperor to submit to them, and invited them to his residence to dinner. Six responded and two declined. When greetings had been exchanged the viceroy said:

"Why have you compelled the merchants to close their shops, the people to refuse to pay their taxes? I have treated you kindly; why are you inconsiderate of me and my country? I have reported your conduct to the Emperor. Do you not understand the position in which you have placed yourselves? Today I have prepared dinner for you."

Saying this, he called to his attendants: "Escort the guests." And soldiers stepped in, handcuffed the leaders, and took them to prison. The viceroy then raided the offices of the Anti-Foreign Loan Society; and, having previously located the two absent leaders in their houses, arrested them. He now had all the leaders and much evidence.

The populace learned of the loss of their leaders and swarmed into the streets, where altars had been erected to the late Emperor Kuang Hsu, and, led by students, marched against the viceroy's official residence. The viceroy closed the city gates and sent cavalry

into the streets to clear them and preserve order. The people were stampeded by the cavalry, which tore along destroying the altars and shrines to Kuang Hsu and trampling under foot incense, candles, and offerings.

Out of the débris, and from their homes, men, women, and children gathered such incense sticks as they could find, and with incense in one hand and yellow paper tablets to Kuang Hsu in the other, pressed toward the viceroy's place. Here the guards took alarm at the manifestations and opened fire upon the crowd, which was crying "Give us back our Loh-lun; give us back our Loh-lun," meaning their leaders.

The moral effect of the loyalty of the soldiers to the viceroy was such that the people dispersed, leaving 26 dead and many wounded. Some of the soldiers were seen to fire over the heads of the crowd. Rain began falling and continued all night and the next day. The troops kept order in the city, but the revolutionists met them in skirmishes in the environs of the capital on the east and south, established a position about 16 miles from the city, and besieged it. Fighting was continuous for 12 days, when the siege was raised and the revolutionists dispersed.

The frequent alarms in the city threw the people into panic. Children screamed in the streets; voices cried "They are coming; they are coming!" and ran wildly about to escape the imaginary rebel militia.

"Get the women and children out the back way; if they come into the street they will be shot," was bawled through the window of a church during worship. Houses were suddenly closed; doors banged and bolts rattled in their sockets as people vanished. Though these were false alarms, it was observed that at least once during the siege Chengtu had a Sunday closing.*

This is one aspect of the event brought about by the reformers that inaugurated the present revolution in China, the most important from the foreign standpoint that China has ever had, and of greater consequence to China than the mere change of a dynasty. The importance to America of political events in China and the fate of the dynasty, which may involve radical changes in the position of the Chinese nation, is very great.

*For a description of Chengtu, see pp. 1103-7.

### CHINESE CARTOONS

The newspaper press of the Chinese reformers furnishes in its cartoons of the three years preceding the revolution a comprehensive picture of the Chinese reform and revolutionary mind. The grievance against the Manchus is singularly rare in these cartoons and goes to show that the Manchu, or "Great Pure" dynasty, in its brilliant history, has a recognized place of fame among the Chinese educated masses.

Out of 300 successive cartoons published in the reform press during three years preceding the rebellion, 81 depict the vices of the mandarin, or official; 37 picture the evils chargeable to the mandarinate. The most frequent grievance in this category is obstruction of parliament.

Seventy cartoons depict foreign oppression of China through loans, indemnities, and violence. An equal number then show China's shortcomings; 12 out of these latter point out the vanity and vices of females, one cartoon representing wives of the day to be luxuries. The ignorance and indifference of the people to their condition get 9 cartoons. China's helplessness in general, due to vice, follows with 8, and next in order come the profligacy of Chinese youths, religious darkness, opium, gambling, the money evil in other forms, worship of office and power, disloyalty, national shame in conduct toward foreigners, etc. Cigarettes come last.

Twenty-six cartoons show the burdens of the people and their sick and broken condition under them. Taxation heads this list, closely followed by press persecution.

The Chinese mind is singularly bal-

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A GENERAL OFFICIAL OF INTERIOR CHINA, NAVAL MANDARIN (ADMIRAL OF THE RIVER FLEET), WIFE AND DAUGHTER: HANKAU

"Dr. W. A. P. Martin, the most famous of living sinologues, aptly characterized China as Chinese when he exclaimed: 'China is not a power; China is an old ash-barrel, held together by the powers, and with a hen inside—goose if you will—sitting on golden eggs.' As between the Chinese ash-barrel and the Manchu goose, there is some choice and it is not disadvantageous to the Manchus" (see pages 1123 and 1135).

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DRAGON NING-PO: CHINA

"China is a vast democracy under nominal control or surveillance of a liberal despotism in the form of the Manchu imperial house, its liberality representing the wisdom of the Manchus in acquiescing in the self-governing disposition of the Chinese, and the despotism representing the ferocity that ages of civilization have not educated from the Asians in the Chinese Empire, the nearly total weight of whom is Chinese" (see page 1126).

anced, and so in this general pictorial gloominess of mind is associated such hope as can be packed into nine cartoons picturing China's triumph over her evils and dangers. Five of these nine refer to the educational and moral reawakening of women and the importance of their reawakened influence. The small residue of the 300 devoted to other topics are of such a miscellaneous nature as to emphasize, more than anything else, perhaps, the importance of the revolution in the mind of the reformer.

The keenest Chinese intellect is displayed in the making of these cartoons. Their acuteness may be seen in one where "parliament" is a word written in the moon, whose reflection entertains a crowd of Chinese on the shore of a lake. There is no inscription whatever, but the obvious meaning, seen at a glance by a Chinese, is, "To China parliament is like the moon's reflection in water—not a thing to be got actually." Another represents parliament, as it was offered to the nation, as only a plaything like a kite.

What could be more exquisite in its bite than a crab, and a mandarin represented as doing a "buck-and-wing" dance, together with the inscription, "Side-steppers"?

China's plight as a nation is the inspiration of every kind of cartoon, one of the most forcible of which shows an old man standing on the stern of a vessel in a desolate stream of idle craft, with this inscription: "China is like a sorrowful man standing on the deck of a vessel, anchored, with no one who can work the sail."

### THE DISLIKE OF THE CHINESE FOR A CENTRALIZED GOVERNMENT CAUSED REVOLT

The existence of war, however, has doubled all the suffering in China which the cartoons have hitherto pictured as burdens of the unhappy Chinese. Perhaps nowhere in the world are the evils of war so terrible as in China.

China's constitutional assemblies have snatched the government from China's rulers and have been unable to manage it by themselves. They have substituted in many places anarchy for order, and they are on trial regarding their ability to create modern government. They are engaged in the greatest attempt at constitutional government in the history of man. The Manchu has disappeared. This is significant as showing that it was only necessary for the Chinese to speak loud enough in order to drive the Manchu from his throne.

Thus, as was stated at the beginning of this paper, China has struck the Manchu dynasty at its unlucky hour, when weakest, when at the lowest ebb of its imperial vitality, relative race strength, wealth, and influence. It has been slowly strangled by the Chinese giant, enchained by the immemorial Chinese system and dependent for power and succor upon the Chinese race. Nevertheless the record of its 271 years is a famous one, and if it dies, it dies fighting for the principle of a strong centralized government—the sole principle which the best friends of China support.

China is what and where she is because she is Chinese. Although the latter-day Chinese have vaulted over the heads of the progressive Manchus, their record, compared with that of the Manchus, is damaging. For 260 years they have been more Manchu than the Manchus, and they can never escape the indictment that up to this hour they have missed the principle, clearly seen by the Manchus, that the Chinese Empire, in order to survive her struggle with the powers, must have a strongly centralized if not imperialistic government.

The causes of the revolution are easily understood. Although the war-cry of the seceders has been "Down with the Manchus," this is no new war-cry. There are no new war-cries in China but that of the foreign idea. That has caused the revolution. But the thing that precipitated the revolution was the Manchu policy of a centralized government, to achieve which the coöperation of the finance and industry of outside powers was essential. And it is here that the

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PEKING: A TYPICAL GATEWAY

"The thing that precipitated the revolution was the Manchu policy of a centralized government, to achieve which the coöperation of the finance and industry of outside powers was essential. The provinces that have set up a republic have not been willing, after immemorial independence, to surrender so little of their states' rights as was demanded by the imperial policy, nor to support a reform which would increase the revenues of the central government, and by the extension of railways and other communications extend its power. The Manchus have not been without fault. They have been too Chinese, too conservative, too exclusive. But in their policy for the welfare of China, those wise statesmen of the Chinese race, like Yuan Shi Kai, have found no fault with them" (see page 1135).

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ENTRANCE OF PALACE OCCUPIED BY CHINA'S FAMOUS EMPRESS DOWAGER: THE FORBIDDEN CITY, PEKING

"To enhance the effect of the mission, a Hunanese school teacher chopped off one of his fingers, and with the spurting blood from the stump wrote an inscription praying the already over-convinced delegates to demand parliament. This act was a good illustration of the extravagant spirit of the revolution, which soon declared for a republic" (see page 1128).

powers become involved. This policy was not adopted by the Manchus without majority support of the Chinese statesmen, among whom were Yuan Shi Kai and Sheng Hsuan-Huai.

Owing to the great prosperity and increased power of the Chinese during the brilliant Manchu era, they have been able to achieve success in revolution, but the parsimonious, inhospitable, and corrupt treatment meted out by them to the throne, and the placing of their government at Peking in point of imperial revenues on a level with the smallest independent states of Europe, have had most to do with this success.

The provinces that have set up a republic have not been willing, after immemorial independence, to surrender so little of their states' rights as was demanded by the imperial policy, nor to support a reform which would increase the revenues of the central government, and by the extension of railways and other communications extend its power.

The Manchus have not been without fault. They have been too Chinese, too conservative, too exclusive. But in their policy for the welfare of China, those wise statesmen of the Chinese race, like Yuan Shi Kai, have found no fault with them.

### CHINA'S GREATEST DANGER

The revolution has been developed and organized by the independent students, chiefly from the provinces of Szechuan and Hunan, and its greatest support comes from the champions of states' rights. Those forces found in the question of loans, promoted by the four capitalistic powers of the world—Great Britain, France, Germany, and the United States—with the desire and willingness of the Chinese government, an excuse for rebellion, secession, and independence. The blow struck at Chengtu, the capital of Szechuan, although only partially successful, is the event that inaugurated the revolution, which it is evident is a revolt against the immemorial Chinese system. The Manchus may go down before the immense figure of rebellion. It will be, on the whole, a glorious defeat; for, notwithstanding the fact that for the last decade or two the throne has made as great mistakes as it could make, its annals are filled with great Manchu names. If this is the end, it is illuminated as brilliantly in this respect as was the beginning.

It is apparent that some time must elapse before both sides in China will be able to appreciate the "golden mean" in which China is to realize a new union.

There are two kinds of revolutionaries and reformers: those favoring a modern monarchy under the Manchu Emperor, and those favoring a republic and the extinction of the Manchu dynasty. The possibilities of the revolutionary situation in China under the circumstances are enough to make the friends of China shudder. Encroachment on states' rights is the grievance in the hearts of rebel republicans at Wuchang, and in the making of the new constitution states' rights will be the sinister rock which the ship of the new Chinese state must avoid.

China's greatest danger after her predilection for extremes and horrors is foreign intervention. Her best and most conservative reformers look forward to a leader who has not yet appeared, and who will unite the various reform elements and reorganize the Empire as a monarchy. Whether as a monarchy or republic, China must always be a nation in whom the United States must find a friend and in whose fate she must count herself concerned.

# MAKING THE FUR SEAL ABUNDANT

By Hugh M. Smith

United States Deputy Commissioner of Fisheries

THE fifteenth of December, 1911, was the time set for the formal adoption of one of the most important international conservation measures that has ever been effected. Pursuant to a convention or treaty concluded at Washington on July 7, 1911, by the United States, Great Britain, Russia, and Japan, the fur seals of the north Pacific Ocean will receive for the first time a form of protection that has been shown to be absolutely necessary, and is guaranteed by these four great powers for a term of 15 years.

The agreement prohibits absolutely pelagic sealing, or the killing of fur seals while in the water, and places the legitimate killing of surplus male seals on land under the direct control of the governments interested.

This convention insures the rescue of the depleted fur-seal herds from commercial extinction; prohibits the citizens or subjects of the contracting powers from engaging in a wasteful, cruel occupation, and removes a long-standing disturbance of international good-will.

Fur seals inhabit certain parts of both the northern and southern hemispheres, but the most important herds live in the north Pacific, represent three distinct but closely related species, and are known as the Alaskan, Russian, and Japanese fur seals, respectively. Although the northern seals roam widely on the high seas, they always resort for breeding purposes to certain definite bits of land, and it is this habit which gives particular nations property rights in them and has created several international complications.

The Japanese seals visit no land except Robben Island and certain islands of the Kurile chain; the Russian seals never go to other shores than those of the Commander Islands, off the coast of Kamchatka; and the Alaskan seals, after distributing themselves over the eastern part of the Pacific Ocean as far south as southern California, make an annual pilgrimage to islands in Bering Sea.

Of all the fur seals, the most numerous and important are those of Alaska, which came to the United States with all the other resources of the territory when Russia ceded her jurisdiction. The Alaskan fur seals have for many years been the subject of protracted national and international discussion, and during the years 1910 and 1911 came in for an unusual amount of attention. In addition to the consideration received during the diplomatic negotiations resulting in the treaty already mentioned, Congress has enacted a new law relating to the seal islands, a new dispensation has come in the administration of the islands, and the government as represented by the Bureau of Fisheries has for the first time engaged in the business of taking and marketing seal skins.

The "new dispensation," as shown in the subsequent text, includes permanent scientific observation and control of the herd, discretionary authority to suspend all killing, and discretionary power to lease the sealing privileges or to exploit them as a government monopoly.

### THE PRIBILOF ISLANDS, WHERE THE SEALS BREED (SEE MAP, PAGE 1141)

The only land to which the Alaskan fur seals ever resort is the group of small, rocky islands lying in Bering Sea 215 miles north of Unalaska Island, the nearest land. These bits of bleak land have come to be popularly known as the Seal Islands, from their most conspicuous feature; but among geographers they are called the Pribilof Islands, in honor of the Russian navigator who, in 1786, while in the employ of a Kamchatkan trading company, followed the migrating seals and ascertained for the first time

where they resorted. The group consists of two main islands, St. Paul and St. George, which are separated by 40 miles of water, and three islets lying within seven miles of the others. St. Paul, the largest island, is 13½ miles long and has an area of 43 square miles; St. George is 12 miles long and covers 30 square miles; while the largest of the islets comprises about 100 acres of extremely rugged volcanic rocks.

Owing to the entire absence of harbors, landings on the islands can be made only in small boats, and then only during calm weather; when storms prevail or a heavy surf is running there is no possible communication between vessels and the shore. The installation of a wireless telegraph plant in 1911 has meant a great deal to the islands and reduced the excessive isolation to which the inhabitants have been subject. Heretofore, from the time the last government vessel leaves in October to the arrival of the first vessel in May, there has been no communication whatever with the outside world.

Throughout the summer dense fogs prevail about the islands, the air is cold and damp, and the sun rarely shines; in autumn cold winds dissipate the fog and clear days are more common. Winter begins in November, and high winds prevail and much snow falls. At the end of the season drift-ice piles high on the northern shores and remains there until May. With the return of warmth, the entire surface of the islands, wherever there is soil, becomes covered with a luxuriant vegetation, consisting of grasses, mosses, and a profusion of showy flowers, of which the most conspicuous are lupine, chrysanthemum, harebell, poppy, betony, squaw-weed, and saxifrage.

### THE PEOPLE OF THE ISLANDS

At the time of the discovery of the Pribilofs there were no human inhabitants. As soon as the Russians began to take seal skins they transferred thereto from the Aleutian Islands a number of natives to do the manual labor, and from time to time established small colonies at various convenient points. When the United States government took over the islands these people came into our control, and since that time they have been "wards of the nation."

The present population numbers about 300 on the two islands. The people have remained true to the influences to which they were first subjected, and in some respects are today more Russian than American at heart. All of them are members of the Russian Church, and all of them have Russian names, selected for the most part from among the nobility.

The United States government has been a faithful guardian of these primitive people. The result is that today they are the most highly civilized, best clothed, best fed, and most healthy of all the natives of Alaska.

### RESPONSIBILITY FOR THE DECLINE OF THE SEAL HERD

When the seal islands came into our custody the fur seals thereon constituted the most valuable aquatic resource that any government ever possessed. Owing to the immense body of animals present and the difficulty of counting with any degree of accuracy, estimates of the size of the herd at that time necessarily differ widely, the extremes being two million and seven million. It is safe to assume that the number was between two and a half and four million, distributed on 20 to 30 rookeries.

At the close of the season of 1911 the Alaskan seal herd consists of not more than 150,000 individuals of all ages.

This appalling dwindling of the herd has occasioned much concern and has subjected the government to much unfavorable criticism, because the government has exercised full and continuous control during all the intervening years up to the present date. It will be seen, however, that the criticism is not justified, for the reason that the decline and decimation of the herd came through causes operating when the seals were on the high seas and beyond the protecting care of their foster father.

It is furthermore a fact that the government took active steps to secure ade-

OUTLINE MAP OF BERING SEA, SHOWING LOCATION OF PRIBILOF ISLANDS

quate protection for the seals when away from the Pribilofs, and that its efforts were frustrated chiefly by the results of an unfortunate international arbitration.

### COMPOSITION OF THE HERD.

Whether the seal herd is large or small, it has a definite organization and composition dependent on the peculiar habits of the species; and not the least interesting thing about the herd is the peculiar set of names applied to its elements in both popular and scientific discourse. In the first place, the most accurate designation of the fur seals is sea bears, as these creatures have strong anatomical relations with the bears and differ markedly from the hair or true seals. This fact was recognized by Steller in 1741 when he gave an account of the "sea bear" found on Bering Island, a designation later perpetuated by Linnæus when he bestowed the technical name of *ursina* on the Russian fur seal.

But although the fur seals as a group may be sea bears, individually they have names which completely ignore their ursine affinities. The adult males are called bulls and the adult females cows. The newly born, however, are neither calves nor cubs, but pups, and the young males are officially known as bachelors. The particular places on the shores of the islands where the seals resort are always called rookeries; and the family unit is the harem, composed of a single bull and any number of cows up to 50, or even more.

### EXTRAORDINARY VITALITY OF SEALS

Although the seals are easily killed by the methods adopted by man for their destruction on sea and land, they are capable of withstanding great privation and of undergoing extraordinary muscular exertion.

To maintain themselves during winter in the tempestuous north Pacific without

Photo from Hugh M. Smith, U. S. Bureau of Fisheries

This rookery, at the southern end of St. Paul Island, is nearly a mile in length, and formerly had an enormous number of seals, perhaps 500,000, but now contains only a few scattered harems, mostly of small size. In the middle foreground are several "pods" of pups. When the pups are only a few days old they leave the family circle and congregate together on the outskirts of the harem, where they sleep and play. This "podding" serves the useful purpose of keeping the pups out of the way of fighting and trampling bulls.

Photo from Hugh M. Smith, U. S. Bureau of Fisheries

ZAPADNI ROOKERY: ST. GEORGE ISLAND

This view, taken in 1906, shows but a vestige of the great body of seals that once frequented the entire beach as thickly as the remnant here shown. Since 1909 this rookery has been still further contracted. In the early years of American occupancy Zapadni contained probably not less than 50,000 seals, and in 1873 the pelts of over 7,500 surplus bachelors were taken here. In 1910 not a single seal was killed on this rookery.

COWS MASSED ON THE BEACH

In former years the seals covered all portions of all the rookeries in even greater density than here represented. Note the numbers sporting in the sea. Photograph taken by the late Dr. H. D. Chichester, a government agent, who was drowned at the islands in 1911

resorting to land is in itself no small accomplishment for air-breathing animals. The females, leaving the islands in November, go further south than any other members of the herd, and in December appear off southern California, where they remain until March. They then begin their long return journey, reaching the islands early in June.

Within two days of their arrival on the rookeries the cows give birth to their pups. Not until ten or twelve days have elapsed do they return to the water or take any food. Then, after washing and playing near the islands, they make their first long trip to the feeding grounds, coming back to the rookeries after three or four days. Thereafter throughout the season the cows make regular feeding trips at intervals of five to ten days.

The seals subsist chiefly on squid, but also on herring, smelt, salmon, pollock, and other kinds of fish, which are caught and eaten in the water. They have prodigious appetites and gorge themselves whenever the opportunity comes.

It is a curious fact that the seals should have made their summer home in the midst of a section of sea singularly deficient in fish life. In early times the food requirements of the herd amounted to a number of millions of pounds of squid and fish daily, and even at present the needs are enormous; but the nearest feeding grounds lie 100 miles away and the most remote fully 200 miles distant, on the submerged plateaus and islands, known as banks, situated on the north side of the Aleutian chain.

The bachelor seals, having no responsibilities and cares, require less food than the mother seals and make less frequent and less expeditious trips to the feeding grounds, and pass much of their time sleeping on land or playing in the water near the shores.

The old bulls, however, have the most extraordinary vitality. Arriving on the islands about the first of May, they remain constantly on land until the last of July or the early part of August without eating a single thing or even drinking, but living on the great amount of fat they have stored up while at sea. During all this time they maintain most vigilant watch over their harem, and are always ready to repel invaders, whether human or others, and to fight their rivals to a finish.

### THE ROOKERIES

Certain rocky beaches and rocky hillsides along the water front have from immemorial times been resorted to by the fur seals for breeding purposes. The favorite type of rookery ground has a moderate slope with coarse rock and a beach of shingle or wave-worn boulders. Here the adults crowd together in dense masses and here the pups are brought forth.

In early Russian days the Pribilof rookeries received distinguishing names, which have been used to the present time. All of the rookeries now occupy much less space than formerly, because of the depletion of the herd and the tendency of the remnants to maintain the same density of formation that was necessary in pristine times. The ratio between the size of the rookeries and the area of the rookery ground is a good criterion of the condition of the herd. The tremendous disparity in recent years graphically tells the pitiful tale of the seals and suggests the great possibilities of the present efforts to replenish the herd.

In close proximity to the rookeries proper are the "hauling grounds," where the young males up to five years of age congregate. These grounds are usually flat, sandy beaches or elevated plats in the rear of the rookeries. The strict discipline of the harems does not permit the intrusion of the young males, and summary ejection awaits the luckless bachelors which, on their way to and from the water, fail to keep on the outskirts of the harems or to observe the neutral runways that are maintained between the harems.

The older males, up to seven years, do not ordinarily have harems, but lead a solitary existence on the water front or on the outskirts of the harems. They have frequent fights with the harem mas-

The very rocky shore to which the seals are here resorting is formed by the breaking down of near-by cliffs. The number of bulls is relatively so large as to lead to constant disturbance. A favorite occupation of the surplus bulls is to steal cows from the harems by seizing them in their jaws and carrying them away bodily or flinging them high in the air. Many cows are thus severely injured, and many pups are crushed by the raging bulls. Section of a small rookery on St. George Island. Photo from Hugh M. Smith, U. S. Bureau of Fisheries.

ters and among themselves, and sometimes, awaiting a favorable opportunity, invade the harems and carry off the cows by main force.

The young females, arriving late in the season, do not generally resort to the hauling grounds, but frequent the disorganized rookeries and spend much of the time playing with the pups.

The full-grown male fur seal is 6 feet long, has a spread of nearly 6 feet between the tips of his outstretched fore-flippers, and weighs up to 450 pounds. The adult female has an average length of 4 feet and an average weight of 75 pounds. The pups weigh 11 pounds at birth and 25 to 30 pounds by the time they have become proficient in swimming, at the age of three months.

At times, especially early in the season, all the seals on land sleep the greater part of the time. A person may note a harem of which every member, even the vigilant master and the hungry pups, is sound asleep.

The seals furthermore have the faculty of sleeping in the water, resting on the back with the long hind-flippers held aloft or snugly folded along the body, and with the nose protruding from the surface. It is this habit of sleeping at sea which enables the hunter to approach close enough to hurl a spear or discharge a load of buckshot, and has resulted in pelagic sealing with all of its attendant evils.

While individual seals or entire harems may be asleep, the rookeries as a whole always present an animated scene, accompanied by a steady volume of discordant sounds both day and night. The bulls frequently utter savage roars of defiance, and keep up a constant scolding, chuckling, and whistling in order to maintain discipline, and the cows have a shrill bleat and the pups an answering cry far more penetrating than the calls of sheep and lamb.

Off each rookery there is throughout the season a party of swimming, playing, sleeping seals, and an incessant passage of seals to and from the rookery and hauling grounds. Some of them are bachelors, but most of them are cows, whose necessity for going to sea for food is greater than that of any other members of the herd, for they have to sustain themselves and also provide nourishment for their pups.

On the approach of cold weather, the cows and pups leave the islands together. Up to that time the pups have subsisted solely on milk, and they then have to learn to catch their own food, consisting of fish and squid. Inasmuch as the natural mortality among the pups in their first year is fully 50 per cent, it is evident that they experience many vicissitudes in the tempestuous seas to which they commit themselves. The males follow shortly after, but some remain about the islands throughout the winter in mild seasons, and the natives always depend on seals for food in December and January.

### EXPLOITATION OF THE FUR SEALS BY RUSSIA

Fur seals and hair seals have always been regarded as legitimate objects of exploitation, and all governments having real or assumed property rights in herds of seals have sanctioned their killing, under restriction, for fur, leather, oil, food, etc.

Beginning in 1786 and continuing until the sale of Alaska, Russians were almost continuously engaged in killing fur seals on the Pribilof Islands. In the earlier years there was a promiscuous scramble among rival companies, so that to maintain order and properly regulate the taking of seals the government was forced in 1799 to give the privilege to a single company, created by imperial decree and having among its shareholders members of the imperial family and the nobility. This association, known as the Russian-American Company, enjoyed a monopoly of this business as long as Russia had control of Alaska. An ukase issued by Alexander I in 1821 for the regulation of the company had as one of its features the prohibition of foreign vessels within 100 miles of the Russian coasts and islands. This ukase involved Russia

Photo from Hugh M. Smith, U. S. Bureau of Fisheries

A SECTION OF KITOVI ROOKERY: ST. PAUL ISLAND

This rookery has undergone marked shrinkage as a consequence of pelagic sealing, and in recent years the section here shown has been entirely destitute of seals

in a dispute with the United States and Great Britain, resulting in the treaties of 1824 and 1825, which recognized Russia's claim to jurisdiction over the whole of Bering Sea, Okhotsk Sea, and other water inclosed by Russian territory.

From the outset the company placed a rational limit on the number of animals killed each year, and in the light of later experience it is evident that the herd would have been fully able to sustain the annual harvest of skins if these had been taken only from the males. But males and females alike were slaughtered in ignorance or disregard of the polygamous character of the seals, and as early as 1806 it was necessary to suspend operations for two years in order to permit the herd to recuperate.

When killing was resumed, however, it was along the same destructive lines, and the mighty fur-seal host continued to dwindle until by 1834 its numbers were reduced to one-fifteenth or one-twentieth of those present in the first years after the discovery of the islands. The suspension of all killing for a term of years then ensued, and by the time operations were resumed the company officials had come to realize that the females should be protected, and later the sacrifice of old bulls and young pups was stopped.

The result was a remarkable recuperation and increase in the herd that afford a valid basis for the belief that speedy recovery of the decimated herds of Alaska, Russia, and Japan may follow the elimination of the factor responsible for their present condition, namely, the indiscriminate killing of males and females at sea. When Russia ceded her jurisdiction over Alaska, the Pribilof fur-seal herd had attained a degree of prosperity closely approaching its condition at the time of its discovery, and we thus came into possession of a resource but little impaired and had a knowledge of its significant history to guide us in its treatment.

### AMERICAN CONTROL OF THE SEAL ISLANDS

It is a cause for congratulation that no country has dealt with its seal life in a more intelligent, humane, and zealous manner than the United States, and it was a cruel fate that for so many years rendered our efforts futile. The only occasion when there was any laxity in our administration of the seal islands was during the first years of our possession, when the government was still unorganized anywhere in the territory and various private companies landed parties on the Pribilofs and took seal skins without any government supervision or restriction. It was in that year that the largest killing in the history of the islands was made; the number of skins obtained was probably not less than 300,000, and may have reached 375,000; but this take was not indiscriminate, was confined to bachelors, and had no effect on the permanence of the herd.

After full consideration of the best method of handling its fur-seal wards and managing its fur-seal industry, the government decided to place the control of the islands under the Treasury Department and to lease the sealing privileges to a responsible company. Congress gave effect to this decision in 1870, and in the same year the competitive offer or bid of the Alaska Commercial Company was accepted as the one most likely to subserve the "interests of the government, the native inhabitants, the parties heretofore engaged in the trade, and the protection of the seal fisheries." By the terms of this lease the company for a period of 20 years was given the right to take annually 100,000 male seals over one year of age, and was required to provide for the subsistence and education of the natives. In 1874 Congress gave the government officers closer control of the situation by authorizing them to determine the number of seals that might be taken each year. In return for this monopoly, the lessee agreed to pay to the United States an annual rental of $55,000 and a tax of $2.62½ on each skin taken. The company took its annual quota of skins and dropped from the scene when its contract expired in 1889.

During the later years of this company's lease there began a decrease in the herd, which became strikingly evi-

Photo from Hugh M. Smith, U. S. Bureau of Fisheries

KITOVI ROOKERY: ST. PAUL ISLAND

This picturesque beach, known as "The Amphitheater," is a part of one of the most celebrated and extensive rookeries of earlier days. The photograph, taken in July, 1901, shows a few harems occupying the fore shore, whereas in former years all the land here represented, and much adjoining space now entirely deserted, was thickly covered with seals throughout the summer.

Photo from Hugh M. Smith, U. S. Bureau of Fisheries

A NEARER VIEW OF TWO HAREMS SHOWN IN THE PRECEDING VIEW

The harem master is on the right, and the cows, nearly all of them with pups beside them, are seen to prefer the rough, boulder-strewn areas rather than the smooth lava bed

A ROOKERY ON ST. GEORGE ISLAND

Most of the cliffs on St. George Island are so close to the beach that little rookery space exists, and the number of seals resorting to that island was never so large as on St. Paul. This type of rookery ground, formed by disintegrating cliffs, supplemented by boulders pushed up by the drift ice each winter, is very favorable for both young and old seals. The white lines on the rocks were placed there to facilitate the government officers in the seemingly hopeless task of taking the annual census of the seals. Photo from Hugh M. Smith, U. S. Bureau of Fisheries.

dent when in 1890 a new corporation, the North American Commercial Company, obtained the lease and entered on its 20-year contract under conditions that were much more favorable to the government: thus, the company paid an annual rental of $60,000 and a tax of $10.62½ on each skin; provided free dwellings, churches, schools, fuel, provisions, and medical attendance for the natives; gave employment to the natives, and cared for the aged, widows, and orphans. The annual quota of skins was placed at 60,000 for the first year, and the government retained the right to fix the quota in each subsequent year.

The new company obtained less than half its quota in 1890, and from that time until the expiration of its lease was never able to secure more than a small percentage of its quota. This was owing to the decline of the herd and the resulting scarcity of killable seals, to restrictions imposed by diplomatic arrangements, and to the exercise of discretionary authority by the government agents.

On the organization of the Department of Commerce and Labor, in 1903, the fur-seal service passed from the custody of the Treasury Department, and in 1909 was placed under the immediate direction of the Bureau of Fisheries. By act of Congress of April 21, 1910, the renewal of a lease of the sealing privileges of the islands was made optional with the Secretary of Commerce and Labor, and in 1910 and 1911 the government exercised direct control over the taking and marketing of seal skins. This has resulted in great pecuniary advantage to the government; but of far greater importance is the placing of the seal herd for the first time in its history under continuous scientific observation and control.

For a century or more London has been the world's market for raw seal skins, and the entire product of the north Pacific land and sea killing has there been disposed of. The salted pelts are graded according to size and quality and sold at public auction in lots of about 100. In 1910 the average price received for the 12,920 skins obtained by the government on the seal islands was $33.

London is also the world's headquarters for the plucking, tanning, and dyeing of seal skins; but London's predominance ceases there, for America is the world's market for prepared seal skins, and 75 per cent of the annual output finds its way to our shores, after paying a duty of 20 per cent.

### THE SCOURGE OF PELAGIC SEALING

Although the indiscriminate killing of seals in the sea had been going on from very early times, this business was not extensive, was conducted by natives using spears in their canoes, and had no appreciable effect on the herd. Even for a number of years after vessels were introduced, in 1872, no damage to the herd resulted, as the same primitive method of capture prevailed. But with the increase in the number of vessels engaged, white hunters became necessary for the manning of the vessels, and with them came the rifle and the shotgun. Then began the carnival of ruin, which has continued to the present time. In 1891 the pelagic sealing fleet had grown to 115 vessels, with crews of 15 to 50 men.

It was the practice of such vessels, with their crews scattered in small boats over a wide area, to intercept the migrating herd off California or Oregon and follow it into Bering Sea, spearing or shooting every seal that was in reach, and then to cruise in Bering Sea in the vicinity of the islands and kill the seals on their way to and from their feeding grounds.

Special inquiry made by the government showed that in different years from 70 to over 90 per cent of the seals killed at sea, either on the northwest coast or in Bering Sea, were females.

What pelagic hunting then meant to the seal herd when so large a fleet was engaged, and what it has meant recently when the fleet was larger in proportion to the number of seals, may be appreciated when it is stated (1) that for every seal killed and secured by the hunters not less than two seals were

Photo from Hugh M. Smith, U. S. Bureau of Fisheries

NEAR VIEW OF A SMALL HAREM, SHOWING A BULL CHARGING THE PHOTOGRAPHER

It is indiscreet for a person to venture so close to the seals under such circumstances, for the bull is always on the alert to repel invaders, and his rush is rapid and irresistible. In this case the photographer was charged by the bull, and was lucky to get away with his heavy plate camera

killed and lost because they sank before the hunters could lay hold of them, while many that were wounded and escaped died later; (2) that for every adult female killed on the way to the islands in spring an unborn pup was sacrificed; (3) that for every female killed after the herd had reached the islands a pup on shore was left to die a lingering death by starvation, and a pup to be born the next season was likewise sacrificed.

### RESULTS OF PARIS AWARD MOST DISASTROUS

The government was not slow to realize the damage done to the seal herd by pelagic sealing, and was led to assume jurisdiction over the entire American side of Bering Sea and to regard as poachers any persons found hunting seals therein. The seizure of vessels flying the United States and British flags followed, and there arose a controversy with Great Britain, which culminated in the reference of the case to an international tribunal of arbitration that met in Paris in 1893. The award of the arbitration court was against the United States on both of the main contentions, namely, that Bering Sea is a closed sea, and that the property right in the seal herd warranted the government in protecting the seals while on the high seas.

Since the award of the Paris tribunal the case of the fur-seal herd has gone from bad to worse. The United States government early showed its good faith by prohibiting its citizens from engaging in the lucrative industry of pelagic sealing; but the subjects of all other countries were permitted to do so, and it was the injection of a new factor, Japan, that contributed more than any other cause to the decimation of our seal herd.

The arbitration court appeared to recognize the necessity for affording some measure of relief to the sadly harassed seals, and accordingly it promulgated certain "regulations for the proper protection and preservation of the fur seals in or habitually resorting to Bering Sea;" but in the entire history of fishery regulation there is probably no other case that affords such a striking example of impotency and inefficiency.

We could have accepted with equanimity the major terms of the Paris award, but we might be justified in regarding the further proceedings as a colossal hoax if their effect had not been so fraught with disaster to the interests of the fur seals and the United States government. A distinguished authority on the fur-seal question has stated that "on the whole, it is difficult to see how a more comfortable and convenient set of regulations could have been prepared had the pelagic sealers themselves drawn them up. It is difficult to see how they could be made more destructive to the herd if that had been their deliberate intent."

Bearing in mind the avowed purpose of these regulations, we note with amazement that in 1894, the first year of their operation, more seals were killed at sea and greater damage was done to the herd than ever before; and during the three years following the opening of Bering Sea to the legalized ravages of the pelagic sealers the immediate loss to the Pribilof herd from this cause was not less than 500,000 seals, of which a large proportion were adult females, while the total land killing during the same period was only 80,000 surplus males!

### THE GOVERNMENT'S FUR-SEAL PROBLEM AND POLICY

The fur-seal problem with which the United States government now has to deal presents several phases. The most important duty the responsible officials have to perform is to conserve and increase the seal herd. This involves continuous care, study, and observation; the determination of the actual condition and needs of the herd, and the application of the results of scientific and economic investigation to the welfare of the seals.

A scarcely less important duty, and one that is in no respect antagonistic to the first, is to provide a revenue and to utilize a highly useful resource at the time when that resource possesses the greatest market value. This involves the

SAND BEACH OF LUKANIN: ST. PAUL ISLAND

Lukanin, or Lukannon, Rookery was named after an early Russian seal hunter. The sand beach at one end of the rookery was once a favorite resort for very young bachelor seals, but this celebrated hauling ground is now entirely unoccupied and has been for a number of years

I met my mates in the morning (and oh, but I am old!),
Where roaring on the ledges the summer ground swell rolled,
I heard them lift the chorus that dropped the breakers' song—
The beaches of Lukannon—two million voices strong!

The song of pleasant stations beside the salt lagoons,
The song of blowing squadrons that shuffled down the dunes,
The song of midnight dances that charmed the sea to flame—
The beaches of Lukannon—before the sealers came!

I met my mates in the morning (I'll never meet them more!),
They came and went in legions that darkened all the shore,
And through the foam-flecked offing as far as voice could reach,
We hailed the landing parties and we sang them up the beach.

The beaches of Lukannon—the winter wheat so tall—
The dripping, crinkled lichens, and the sea fog drenching all!
The platforms of our playground, all shining smooth and worn!
The beaches of Lukannon—the home where we were born!

I meet my mates in the morning, a broken, scattered band,
Men shoot us in the water and club us on the land;
Men drive us to the salt house, like silly sheep and tame,
And still we sing Lukannon—before the sealers came.

Wheel down, wheel down to southward, oh, Gooverooska go!
And tell the deepsea viceroys the story of our woe;
Ere, empty as the shark's egg the winter flings ashore,
The beaches of Lukannon shall know their sons no more!

—*Rudyard Kipling in "The Jungle Book."*

This lot of young male seals have "hauled out" to sleep on an out-of-the-way beach, and have been surprised by the photographer. Some of them are still sleeping, but most of them are aroused and some are escaping hurriedly to the water. The young male seals are much more wary and difficult to approach than the cows, and are ready to rush into the sea at the sight of a man, and may even be stampeded by the scent of man carried on the wind for a quarter of a mile. The seals here showing uniformly dark fur are four or five years old, and have passed the age when their pelts are most valuable, while those with contrasty coats and light patches on breast and abdomen are in prime condition and are the only ones utilized by the government (see page 1145). Photo from Hugh M. Smith, U. S. Bureau of Fisheries.

Photo by Dr. Charles H. Townsend, New York Aquarium

A RARE VIEW OF A SLEEPING BACHELOR (SEE PAGES 1145 AND 1147)

This seal had just come from the water, and was sleeping so soundly that he was approached within a few feet. His fur, daubed with sand and dripping from the sea, could not be recognized as the same that enters into a beautiful seal-skin jacket

Photo from Hugh M. Smith, U. S. Bureau of Fisheries

NORTHWEST COAST INDIANS HUNTING FUR SEALS

In this primitive method of seal hunting the Indians in their canoes seek the seals, which, after gorging themselves with food, sleep at the surface during the process of digestion. While one man stealthily propels the canoe with noiseless strokes of his paddle, the other stands in the bow and holds ready a long-handled, two-headed spear with detachable barb fastened to a lanyard. The spear is hurled with deadly accuracy at close range, and the doomed seal is dragged into the boat by the lanyard and despatched with a club.

judicious killing of the male seals when they are two or three years old and the disposal of their pelts to the best advantage. A third duty is to ascertain what are the real needs of the helpless native inhabitants of the seal islands, and to give them the aid that is best suited for their mental, moral, and physical natures.

A point which has been overlooked or ignored in most recent criticism of the government's policy regarding the administration of the seal islands is that the interests of government and fur seals are necessarily interdependent. To maintain the physical condition of the herd at the highest point of perfection will insure the largest economic returns therefrom; to exploit the herd beyond its capacity will inevitably and quickly bring a diminution in financial proceeds.

Fortunately it is easily possible always to keep well within the limits of safety in utilizing the surplus male seals, and it is a well-known and significant fact that one of the periods of greatest damage to the seal herd from internal causes resulted from a suspension of killing operations on land, under the terms of a modus vivendi arranged between the United States and Great Britain pending the outcome of arbitration proceedings.

### WELFARE OF HERD DEMANDS KILLING OF SURPLUS MALES

Recent criticism of the government's policy of taking the skins of seals in view of the depleted condition of the herd is based on deficient knowledge. The fur seal being a highly polygamous animal, and males and females being born in equal numbers, it follows that under the conditions that have prevailed and still continue the number of males produced is far in excess of the requirements of

Photo from Hugh M. Smith, U. S. Bureau of Fisheries

A GULLY IN ZAPADNI ROOKERY: ST. PAUL ISLAND

This used to be a favorite playground for the pups, and at times so many dead pups were found there as to give it the name of the "Zapadni death trap." Deaths early in the season were due largely to a parasitic worm which infests the sand and gets into the pups' intestines; but deaths later were caused by starvation, owing to the killing of the mother seals at sea. This and other death traps in the rookeries have been unoccupied in recent years owing to retraction of the herd, but in 1896 over 4,300 dead pups were counted on Zapadni alone.

Photo from Hugh M. Smith, U. S. Bureau of Fisheries

DEAD PUPS ON A SECTION OF TOLSTOI ROOKERY: ST. PAUL ISLAND

This gruesome picture is unfortunately typical of various rookeries and numerous occasions. All the living seals have been driven off except two bulls which refused to leave their stations, and the bodies of upward of 100 dead pups are disclosed in this limited area. Some of the pups succumbed to the parasitic sand worm, but most of them died from slow starvation owing to the killing of their mothers by the pelagic sealers (see p. 1153).

Photo by Walter I. Lembkey, U. S. Bureau of Fisheries

A MOTHER SEAL AND HER NEW-BORN PUP (SEE PAGE 1145)

After the second year each cow seal bears one pup annually for a period of probably ten years. The fur-seal pup from its birth until it leaves the islands in winter is nourished exclusively on milk. The killing of the mother seals while at sea, where they are obliged to go for food, therefore results in the death of their pups by slow starvation, and is a most serious injury to the herd from the loss of the potential productivity of the cows in subsequent years.

Photo from Hugh M. Smith, U. S. Bureau of Fisheries

A CAPTURED PELAGIC SEALING SCHOONER ON THE BEACH AT UNALASKA

When sealing is conducted far from land the hunters make their headquarters on small schooners and distribute themselves in all directions in canoes or rowboats while seeking the seals. It has often happened in the past and occasionally happens now that the cupidity of the sealers leads them to take their vessels into forbidden territory, where they are likely to be apprehended by the vigilant revenue cutters patrolling the vicinity of the Pribilofs. This view is of a captured Canadian schooner in charge of a prize crew; her sealing canoes may be seen under the cliff.

nature for the perpetuation of the species.

The preservation and increase of the seal herd is entirely compatible with judicious sacrifice of a limited number of young male seals each year, and this is quite as true when the herd is depleted as when the rookeries are crowded to their full capacity. When the presence of a sufficient reserve is determined by responsible officers of the government, the utilization of the surplus males for their pelts and incidentally for native food is justified and demanded by common sense, and fulfills the utmost demands of both the spirit and the letter of genuine conservation.

If not a single male seal were to be killed on the islands or at sea during the next five years, not a single additional seal would be *produced* as a result of that course. If not a single male seal were to be killed on the islands or at sea during the next 20 years, not a single seal would be added to the herd that will not be added if the present policy of restricted killing of surplus males is continued.

The history of the Alaska seal herd clearly indicates that it is capable of

A RUSSIAN FUR-SEAL ROOKERY

The seal herd resorting to islands off the coast of Kamtchatka is in an even more depleted condition than the Pribilof herd, owing to the ravages and raids of American, Canadian, and Japanese pelagic sealers, combined with injudicious land killing. The Russian seals never mingle with the Alaskan seals, and have anatomical peculiarities by which the zoologist may recognize them, while the quality and color of their fur enable furriers to distinguish them from other species. Photo from Hugh M. Smith, U. S. Bureau of Fisheries.

complete and rapid recuperation. Notwithstanding that only a remnant of the once mighty fur-seal hosts now exists, the outlook for the preservation and restoration of the herd is more propitious than at any previous time (see p. 1149).

This optimistic view is based on the facts that the seals are now receiving what they never before had but always needed, namely, continuous scientific supervision on which the conduct of the commercial features of the business will depend; that the fixed policy of the government is to administer the affairs of the seal islands with due regard for the mutual interests of the seal herd and the public, and that the sole and now generally recognized cause of the present decline, namely, pelagic sealing, is by an international convention altogether eliminated for 15 years and possibly for all time.

# THE ARBITRATION TREATIES*

By William Howard Taft

PRESIDENT OF THE UNITED STATES

I AM very glad to be present at the opening of this conference of the Society favoring an international arbitral court. I believe this to be an ideal which, when realized, will offer a practical solution for the difficulties now presented by universal armament.

Europe is an armed camp. Each nation feels that it cannot in justice to its people, or with safety to its integrity, avoid expending money enough on its army and navy to prevent its dissolution should international controversies arise that could not be solved otherwise than by war. Repeated attempts have been made to secure a lessening of armament; they have failed because each nation says to the other, "Well, you do it first." The consequence is that to any one charged with the responsibilities of government under present conditions, armament is a necessity.

I have been engaged for some time in preaching peace—and preaching it just as hard as I can; but I have got to recommend to Congress the appropriation of money enough to have an armament that shall meet existing conditions.

## SHALL WE FORTIFY THE PANAMA CANAL?

For example, the question presents itself: Shall we fortify the Panama Canal? There are those who are so much interested in peace, and who believe in it so much as a sign, as a symbol, that they think the suggestion that the Panama Canal ought to be fortified is inconsistent in the mouth of one who advocates peace as strongly as I do. But it is one thing to look forward to an ideal, and it is another thing to meet present conditions. My own impression is that he who proceeds practically to a reform is much more likely to accomplish it than he who sacrifices everything to a name and to a fetish.

We are not seeking war by fortifying the Panama Canal; we are not going to fight anybody on account of fortifying the canal. But we built the canal as part of our coast line and to double the efficiency of our navy, and if we should now neutralize the canal, it would give the same facilities to our enemy in attacking our shores as we enjoy ourselves, which is to lose half the value of the canal as a war measure. Hence I am in favor of fortifying the Panama Canal, preventing its use by the enemy, and of using it ourselves in self-defense. In other words, we must use common sense in dealing with every problem. A position like this which recognizes present conditions is not inconsistent with pressing forward

* An address to the American Society for Judicial Settlement of International Disputes, Cincinnati, November 7, 1911, and specially revised by President Taft for publication in the National Geographic Magazine.

to change the conditions that render necessary such a policy.

### IS WAR NECESSARY FOR THE DEVELOPMENT OF HUMANKIND?

Now there are those—and I am not disposed to do other than to reason with them—who say that war is absolutely necessary for the development of humankind, and they can point in history to certain wars without which the progress that was made might not have been. They can say, for instance, that we should still be related to England as a colony but for the War of Independence; that we might still have slavery but for the Civil War, by which we were enabled to excise the cancer of slavery. But there are other wars that we might have avoided had we proceeded as we are planning to proceed today.

War doubtless does develop the stronger virtues of men; anything that tends to make men sacrifice themselves does so. But I rather think that in hunting through the life of a nation and the life of a generation, we will find enough things to test character, to invite sacrifice, without our insisting upon having war in order to develop human nature.

I am glad to be here today, because it is only about a year ago that I had the honor of attending a banquet of this same Society, and of repeating at that banquet what I had ventured to say only casually some six months before, to wit: that I had noticed in a number of our treaties with foreign nations that there were excepted from the causes which were to be arbitrated those which involved national honor or vital interest; that I did not see any reason why we might not just as well arbitrate a question of national honor or vital interest as anything else. That observation was followed at the banquet of this Society a year ago by the statement that I hoped we might be able to make a treaty with some prominent nation in Europe by which we would agree to arbitrate every controversy that could arise between us, whether it involved national honor or vital interest or not.

That remark was taken up first by the ambassador from France, who sat next to me. When I sat down he said, "We will make such a treaty with you," and I replied, "I'm your man."

Then we waited awhile and Sir Edward Grey, on the floor of Parliament, in deploring the increase in naval appropriations, referred to my remarks and said that, speaking for his government, they were most anxious to enter into such a treaty. He was followed by Mr. Balfour, the leader of the Opposition, who concurred in his statement and urged the wisdom of such an agreement between us. There followed the necessary negotiations, which resulted in these treaties, one with Great Britain and one with France. They were submitted to the Senate. The majority of the Committee on Foreign Relations reported the treaties to the Senate with the recommendation that they be ratified with an amendment which struck out the third clause. I am coming to that a little later.

### QUESTIONS OF NATIONAL HONOR

I only want now to take up the first proposition involved in these treaties, and that is the elimination from the exceptions in the old treaties of questions of national honor and vital interest. It struck me, as I am sure it must strike you when you read a treaty that says, "We will agree to arbitrate everything that arises between us except questions of national honor or vital interest," that you have omitted, from the things which you are to arbitrate, about everything that is likely to lead to war. At least, you have put into the treaty words which any nation that desires to avoid arbitration can fall back upon as including everything that they wish to include within that description.

So far, therefore, as facilitating peace and avoiding war are concerned, these treaties might just as well have been written in water, except that they express the general desire to arbitrate when it is easier to arbitrate than otherwise.

Now I am asked, "Would you arbitrate a question of national honor? Would you submit to arbitration your personal honor?" I have no hesitation in answering that exactly as it is put: I would much prefer to submit to a board of

arbitration, composed of intelligent jurists of an impartial mind, the question whether our national honor has been attacked, and if so, what the reparation of the injuring nation ought to be, than I would to go to war about it.

What would war settle? If we wiped our enemy off the map, it would settle the fact that we were the stronger nation, and if we were wiped off the map, it would settle the fact that they were—and that is all it would settle!

Napoleon said that the Lord was on the side of the stronger battalions. Of course, if we wiped the enemy off the map, we would at once claim that the Lord was with us, and that would be a satisfactory arrangement. But it is a little difficult to explain our relations to the Lord if we are wiped off the map.

That was exactly the principle of the *code duello*. If I claimed to be a gentleman and was insulted by a gentleman—of course, we all had to be gentlemen in those days in order that the code should work—if I were insulted by a man who called himself a gentleman, the *code duello* required that I should go out and make myself a target for him because he had insulted me. Of course, the reverse was true—that he had to make himself a target for me; and if I hit him, the arrangement seemed for the time to be satisfactory to me; but if he hit me—and being a larger mark, I think that would be more probable—it would take a good deal longer than the two months, or four months, of convalescence, for me to reason out the satisfactoriness of the arrangement by which my honor was satisfied by his shooting me.

Now at common law, if one man sued another on a promissory note or a bond, and the defendant came into court and was a little short of witnesses, and the issue raised was whether he had ever made the note; or, if he had made it, whether he had paid it, the defendant could demand wager of battle. Then the judge handed out, or had somebody hand out for him, two swords, and the defendant and the plaintiff went at each other; and if the defendant cut off the head, or the hand, or the arm, or in any way rendered helpless the plaintiff, that proved either that the defendant had never made the note; or, if he had made it, that he had paid it.

They discontinued that several hundred years ago; but I should like to have you take home with you the question, in what regard that method of settling the issues in a court of law differs from the method of settling issues now between the nations? If the analogy is not exact, I do not know what an analogy is. We ought to find some way to avoid resort to the ridiculous method we now have of settling international controversies.

Certainly when reference to the old way of settling an issue in court awakens our ridicule, it ought at the same time to awaken our shame that we have not, up to now, found some wiser method of settling international controversies which present precisely the same kind of issues.

### THE TREATIES THAT MAKE WAR IMPOSSIBLE

Now the treaties are alike; they are so much alike that I can take one as an example of both.

Let me take the English treaty. It recites that we have not had war with England for nearly 100 years; that we do not intend to have war with England ever, and that we have made treaties of arbitration which have exceptions that we wish to eliminate, and that we propose to make a treaty that will render war impossible. We then proceed to agree, first, that we will submit, either to The Hague Tribunal or to some other tribunal to be agreed upon by the parties, all differences hereafter arising between the two nations which are justiciable; that is, as defined by the clause, which can be settled by the application of the rules of law or equity. Then the clause provides for a special agreement, to be initiated by the President and approved by the Senate, submitting to arbitration the question which has arisen.

The second clause provides—perhaps I ought to take the second and third clauses together—the second clause provides for the organization of what is called a joint high commission. That consists of three Englishmen and three Americans, unless they agree to select

other than what are called the nationals of the two parties. There is some question as to how these men are to be selected; there have been those who intimated a doubt as to whether it was wise to permit the selection to be left to the President. I think that is not a very important question. I am entirely willing to have the men confirmed by the Senate, or to have them selected by the Senate, if that be necessary. That, I think, can be easily changed or made so as to suit everybody. Whether it be by the President or by the President and the Senate, I have no doubt but that three suitable persons would be selected. Now this joint high commission is to perform, under the second clause, two functions. The first function is to take up every difference, whether it be justiciable or not, to investigate and to make recommendations for its solution without arbitration; in other words, it is a means of avoiding, not only war, but arbitration.

The Senate committee, or a majority of them, have found in that second and third clause rather a stirrer-up of war than a clause which avoids war. I confess myself unable to follow their reasoning. The clause provides that the commission shall first investigate and finally recommend; shall give hearing and be an adviser to both nations; and it provides that if either nation require it, the final advice shall not be given for a year. I regard that as one of the most admirable clauses in the treaty, for the reason that it postpones the effect of the momentary passion of the people of either country, so that they have a chance to cool off; they have a year to think over the question whether they wish to precipitate their country into the sufferings of war. There is nothing that helps the solution of difficulties arising from anger so much as time.

I do not know but that I may be entering upon a confession when I put an illustration before you with the thought that some men in the audience perhaps have been through the same experience. Something happens at the office or the store to anger you, and you cannot get it out of your system. You go home and make yourself disagreeable to your wife, and you hear her whisper to the children, "Papa isn't feeling very well today; don't disturb him," and you are left solitary with nobody to interrupt or interfere and with nothing to prevent your contemplation of yourself. After awhile, as the darkness of the evening comes on, you realize what an ineffable ass you are making of yourself, and how you are treating those who had nothing to do with the original cause as if they were responsible for it.

Now what is true of an individual is true of a nation. It is not so true as I would like to have it, because the conscience of an individual is usually better and higher than that of a nation; but the progress of Christian civilization is the elimination of the difference between the conscience of the individual and the conscience of the nation. We have the right to reason that time, which helps so much in subduing the unreasoning quality of anger and momentary passion in individuals, will have the same effect upon nations; and in many respects I think that clause is one of the best things in the treaty, and that if we can hold the two nations off for a year they will never come to blows at all. But the nub of the trouble which the Senate committee has is in the function to be performed by this joint high commission when there is a difference of opinion as to whether the controversy arising is a justiciable one which must be arbitrated under the treaty. That commission in such case has the right to decide whether the controversy comes within the definition or not; and if it is decided that they shall go on to arbitrate, the treaty recites that they shall go on to arbitrate as provided in the first clause.

Now under the first clause the Senate must concur in a special agreement defining the question to be arbitrated, and there probably—Mr. Knox thinks certainly—the Senate has the power to withhold its consent even after the joint high commission has acted. The Executive is bound; the Senate may still refuse. But if a commission like this unanimously, or by a vote of five to one, as the treaty requires, decides the question to be arbitrable, the pressure upon

the Senate would be such that probably it would not withhold its consent to an agreement.

Personally I would have made the treaty—if I had the making of it and the ratification, too—I would have made the treaty so that the board of arbitration should have had the jurisdiction to decide, upon the application of either party, whether the question arising came within the treaty. I would leave the question to it exactly as I would leave the question to a court of superior jurisdiction. But evidently we have not quite got to that stage, though this is a step in that direction. I believe the arbitral court to be the solution of the difficulty; and when I say "arbitral court," I mean a court whose jurisdiction and power are established by joint agreement of all nations—a court into which one nation may summon another for a hearing upon a complaint and for a judgment, and may rely upon the judgment being carried out through the public opinion of the nations, or by an auxiliary force, if necessary. When we have such an arbitral court, then disarmament will follow.

Now then, if we are going to take a step in that direction—if we are going to take up arbitration between nations *seriously*, if we hope first to make such treaties of arbitration with all the world, and later see the world of nations make such treaties with each other—then, my friends, in order to make a real step forward we ought to make an arbitration treaty that means something, and we ought to make it "for keeps." We ought to make it like the medicine that the Indian desired—something that bites when it goes down the throat—because the Indian does not believe that otherwise the cure will be effective.

### ARBITRATION CANNOT RESULT IN VICTORY FOR BOTH PARTIES

Arbitration cannot result in victory for both parties; somebody has got to be beaten. We cannot play "Heads I win, tails you lose"; we have got to have the people accept the fact that sometimes we may be beaten. We ought not to arrange something with a string to it, so that when we think we are going to lose we can back out of arbitration and open up the possibility of war. We ought to put ourselves in such a situation that sometimes it will hurt us; we ought to subscribe to and carry out the treaty and stand to its terms. If we do not, then we are not making any progress. Therefore, while I appreciate the sensitiveness of the Senate with respect to this, and while I regard that feeling with respectful consideration, I think, nevertheless, that it is mistaken. I believe that we can well afford to go ahead and occasionally lose an arbitration in the general cause of the peace of the world.

We are a just nation; we are not likely to get into difficulties without just cause. But sometimes we may, and if we do we ought to be willing to stand up and take the consequences or not go into arbitration at all. It is all right to advocate peace and arbitration from the platform, and it is all right to have peace societies and conventions pass resolutions, and all that sort of thing; but unless we are willing to put ourselves in a place where we may be prejudiced sometimes by an arbitration, then the arbitration we agree to is not one of those real steps forward in the progress of civilization that we ought to urge.

I feel very deeply about the ratification of these treaties. The European countries have gone into the matter wholeheartedly. The reason is that when the question was agitated in England, in France, and even in Germany, it was the common people that pressed it to conclusion; they were the ones that rose and urged that the treaties be made and carried through. And why? The answer is significant; it is most pregnant: because they realized that when they go to war it is the plain common people that have to "pay the piper"; it is the plain common people that are food for powder. There are only a few leaders that wear the feathers and gold lace; it is the plain common people, their mothers, their sisters, and their daughters, that have to go through agonies of spirit waiting to hear from the battlefield. Hence it is that it is the cause of the people the world around that we are advocating; it is the cause of the people the world around that by pressing these treaties for ratification we are upholding.

WE SHOULD TAKE THE LEAD

Now are we going to say that because of narrowness in our Constitution we cannot enter into a treaty like this and lead the world? We are a people of 90 millions between oceans; we have the greatest resources of any country in the world, and if we had a prolonged war we have resources that would enable us to meet any country successfully. We are not afraid of any country, and we are not progressing in the direction of peace because we are afraid. Therefore we occupy a position of advantage in dealing with a question like this such that nobody can charge us with cowardice in seeking other means than that of war in settling controversies. We have no entangling alliances; we are isolated by the oceans, which in event of war would give us an advantage which all the nations of the world realize; and all the nations of the world, therefore, expect us to help them in that difficult situation in which they find themselves, where they are an armed camp and have to watch each other as if each were constant enemies.

Now are we, by rejecting these treaties in the Senate, going to say to the world: "Oh, yes; we have the deepest sympathy with you. We hope you will come out all right; we hope that peace will prevail. But, you see, we have got a provision in our Constitution that requires us to stop and look on. We can cheer you with encouraging words, but we cannot join you in the work!"

Norway and Sweden have made a treaty in which they agree to arbitrate certain classes of questions, and they say, "We will submit to the board of arbitration the question whether any issue which does arise comes within the class described in the treaty." If Norway and Sweden can do that, why cannot we?

That Constitution of which we are so proud, that Constitution which is the greatest fundamental compact of government ever struck from the brain of man, has always shown itself equal to any emergency that has heretofore arisen, with its simple, elastic provisions, which enable it to m on with the nation's progress, which open themselves to embrace every improvement that is needed for the progress of Christian civilization and the progress of our government. Are we going to give that Constitution such narrow construction as to take a retrograde step and to become merely an observer of the world's progress toward universal peace, or are we going to lead? Well, I think there is only one answer to that question. I sincerely hope that the Senate will respect that answer. I believe that answer ought to come from the body of the people. I believe that they want these treaties ratified, and I am very sure that when they are ratified they will be such a substantial step forward that we will all rejoice in their accomplishment. I do not regard them as important in keeping us out of a war with England or with France; we are never going to war with England or with France. They are useful by way of example to the whole world that we are willing to put ourselves in that situation with respect to those countries, and that those countries are willing to put themselves in that situation with respect to us.

The moment the treaties are ratified there will be other nations only too glad to make the same treaties with us, and when we have made treaties with all the nations of this character we must necessarily and reasonably expect that they will begin to make such treaties with each other; and when that is done we have reached the stage of an arbitral court.

OUR RELATIONS WITH SANTO DOMINGO

As I have said, these are useful treaties by way of example. But I should like to call to your attention and to the attention of this Society some special instances in treaties that are now pending in the Senate, bringing about a hope of peace where peace is not.

We had a treaty with Santo Domingo. Santo Domingo was one of those republics, so called, in the West Indies, where the professional business of a revolutionist was much more lucrative than that of lawyer or doctor, or any of the learned professions; and the point of attack was always the revenue office, the customs

office. There was a good deal of trouble about foreign debts. Finally, I don't know exactly how, we did get into such a relation with Santo Domingo, subsequently confirmed by treaty, that we appointed revenue officers to collect the revenue, under an agreement to deposit 45 per cent in New York to meet the foreign debt, which had been scaled down properly, and to pay 55 per cent of the revenue to Santo Domingo. That has been in operation for five years. Meanwhile they have not had any revolution there at all, and the 55 per cent of the present revenue far exceeds the whole revenue they collected when they were not paying anything on the debt at all, and the debt under the application of this 45 per cent is now nearly wiped out. Now, how explain this? Why, the professional revolutionist learned that if he sought the only object of a revolution, to wit, the custom house, where he might collect the taxes, Uncle Sam would interfere. We did not have to send any naval force or any army there. The revolutionist simply had to know that Uncle Sam would be there if he interfered, and they have gone on now and are becoming, I hope, a prosperous republic.

### THE REVOLUTIONIST WILL GO OUT OF BUSINESS

The center of most wars in this hemispheres is in the five republics of Central America, Honduras, Nicaragua, Guatemala, Costa Rica, and San Salvador. In Honduras they have had 7 revolutions in 15 years, and now they are a little tired.

Honduras reaches from one ocean to the other, and whenever they have a fight in any one of the republics they seek a battle-ground in the territory of Honduras; and so she maintains an army and spends I don't know how much a year on it. But just now she hasn't got any money to maintain an army—she hasn't any credit—and, having learned of the successful operation of the system we established in Santo Domingo, she has asked us to help her. Accordingly we have made a treaty with her by which she is authorized to make a contract of loan. She has a 26-million debt, which, with compound interest that has not been paid, amounts to 126 million dollars. Arrangements with her foreign creditors reduce the whole debt, under certain conditions, to 4½ million dollars, and she wishes to borrow 10 million dollars in order to pay off this debt and, in addition, make certain improvements that are very necessary to the prosperity of the country. She has succeeded in making that contract in New York with an American banking firm. The treaty provides that we shall advise her as to whether the contract is a good one, and that we will join with the fiscal agent in recommending the collectors of the revenue, which is pledged as a security for the payment of the loan of 10 millions. Then there is a provision in the treaty that the United States reserves to itself the right to exercise such direction as may seem wise over the revenue agents thus appointed. There is not any obligation on our part to go in there if we do not want to; but the very fact that we have the right to go there is enough to eliminate the profession of the revolutionist from Honduras, because there is no profit in the business unless they can get at the revenues.

Now the Senate objects—or some of the Senate object—and they have published this treaty for the consideration of the people. A similar treaty, under similar circumstances, has been made with Nicaragua, and I say those treaties ought to be confirmed. It is said that the Monroe Doctrine does not require us to see to the collection of loans; but that is not the question. Of course we know that the Monroe Doctrine was directed against an invasion by the Holy Alliance of the republican governments which had been established in the countries that had made themselves independent of Spain. But the condition that confronts us today is this: we live in a hemisphere with 21 different republics. All are close neighbors of ours with whom we trade. We are a great, rich nation, able to do a great many things, able to help others in the community of nations; and there rests upon us as a nation just as much of an obligation to help in a community of nations like that as there rests upon a great, fortunate, wealthy man in a small com-

munity of individuals the duty to help the unfortunate among them. It is not going to cost us anything; it will probably help our trade; but I am not advocating either of those reasons as the basis for our action. The Lord did not give us the advantages we have without charging us with the responsibility of using them for the benefit of the world.

Now as a means of preventing wars—frequent wars—these two treaties, small matters as they are, are more important than the other treaties that I have been discussing, though of course in their world importance and throughout a long period of years the latter are of vastly greater interest. But for the immediate settlement of war these two treaties are more direct than the treaties with France and with England.

THE MONROE DOCTRINE

Just here I am reminded that certain objections which I have not considered are advanced against the greater treaties. One is the Monroe Doctrine. The answer is that that doctrine does not come within the description of a justiciable matter. Sir Edward Grey said so on the floor of Parliament, and John Bassett Moore, an eminent authority on international law, has said the same thing.

Again, it is urged that an attempt may be made to arbitrate a question of immigration, and that some undesirable race might thus be forced upon us. Well, it is a first principle of international law that each country shall decide for itself what aliens shall come within its borders. Congress could exclude, if it chose—I give the instance only to show the arbitrary character of the power—all bald-headed immigrants, or all red-headed immigrants. Therefore, unless we bind ourselves by treaty, there is no possible way of forcing the reference of such a question to arbitration.

So it is with respect to the tariff. We have a right to exclude anything from coming into the country, or to impose any conditions upon its coming in; therefore they could not force us to arbitrate the question of the tariff. Other questions might be mentioned the reference of which to arbitration might embarrass us. Personally I am willing to be embarrassed. I think we ought to come to a point where we will not take positions that cannot be sustained under the rules of law and equity; but I realize that there is a strong feeling the other way, and we have not gone to that extent in these treaties. We are making progress by them, and if we ratify them we will have taken a long step forward; and, having taken that step, then we can look about to see what step we can take next in order to make surer the coming of that arbitral court for which this Society is founded, and in the prosecution of which object I think all good men ought to help.

Another question is just proposed by a gentlemen from a Southern State, namely, the danger of submitting to arbitration the question of the payment of certain bonds that have been repudiated. Well, the language of the treaty is, "In all cases hereafter arising," which excludes these bonds. Therefore, if anybody is sensitive on that subject, he has no need to fear this treaty.

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## NATIONAL GEOGRAPHIC SOCIETY

The Annual Banquet of the National Geographic Society will be held on Friday evening, January 26, at the New Willard Hotel, Washington, D. C. It is expected that it will be the most notable in the history of the organization. Members desiring to attend can secure full information by applying at the office of the Society.

**January 5.**—Mr. Rustom Rustomjee, a distinguished native scholar of India now visiting America, will address the National Geographic Society on "The Parsees." The lecture, "A Woman's Climbs in the High Alps," by Miss Dora Keen, has been postponed to February or March.

**January 12, 4.00 p. m.**—The Annual Meeting of the National Geographic Society will be held at Hubbard Memorial Hall.

**January 12, 4.50 p. m. and 8.15 p. m.**—"The Balkan States: Montenegro, Servia, and Bulgaria." By Mr. E. M. Newman.

**January 19.**—"What the Japanese Have Done for Formosa." By Dr. Inazo Nitobe, of the University of Tokyo.